CFR 47 FCC PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

Tablet

MODEL NUMBER: VT-TABLET-5081G

FCC ID: 2AAGE5081GB4898

REPORT NUMBER: 4790198193.1-3

ISSUE DATE: December 20, 2021

Prepared for

Chengdu Vantron Technology Co, Ltd.
No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch

Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China

Tel: +86 769 22038881
Fax: +86 769 33244054
Website: www.ul.com

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	12/20/2021	Initial Issue	

Summary of Test Results			
Clause	**Test Items**	**FCC Rules**	**Test Results**
1	6dB Bandwidth and 99% Occupied Bandwidth	FCC Part 15.247 (a) (2)	Pass
2	Conducted Output Power	FCC Part 15.247 (b) (3)	Pass
3	Power Spectral Density	FCC Part 15.247 (e)	Pass
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d)	Pass
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205	Pass
6	Conducted Emission Test for AC Power Port	FCC Part 15.207	Pass
7	Antenna Requirement	FCC Part 15.203	Pass

Note:
1.This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >when <Accuracy Method> decision rule is applied.

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Chengdu Vantron Technology Co., Ltd.
Address:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China

Manufacturer Information

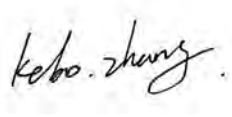
Company Name:	Chengdu Vantron Technology Co., Ltd.
Address:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China

EUT Information

EUT Name:	Tablet
Model:	VT-TABLET-5081G
Brand:	VANTRON
Sample Received Date:	November 23, 2021
Sample Status:	Normal
Sample ID:	4432310
Date of Tested:	November 23 ~ December 17, 2021

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART C	PASS

Prepared By:



Kebo Zhang
Project Engineer

Checked By:

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo
Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, KDB 662911 D01 Multiple Transmitter Output v02r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **ISED (Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046. **VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011

Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz)	5.78 dB (1 GHz ~ 18 GHz)
	5.23 dB (18 GHz ~ 26 GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Tablet
Model	VT-TABLET-5081G
Radio Technology	IEEE802.11b/g/n HT20
Operation frequency	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz
Modulation	IEEE 802.11b: DSSS(CCK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
Rated Input	DC 5 V, 2A
Li-ion Battery	3.8 V, 8000 mAh, 30.4Wh

5.2. CHANNEL LIST

Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452	/	/

5.3. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		UART					
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11b	1	default	default	default	/		
802.11g	1	default	default	default			
802.11n HT20	1	default	default	default			

5.4. MAXIMUM OUTPUT POWER

IEEE Std. 802.11	Frequency (MHz)	Channel Number	Maximum Conducted AVG Output Power (dBm)
B SISO	2412 ~ 2462	1-11[11]	13.48
G SISO	2412 ~ 2462	1-11[11]	13.22
n HT20 MIMO	2412 ~ 2462	1-11[11]	15.75

5.5. TEST CHANNEL CONFIGURATION

IEEE Std. 802.11	Test Channel Number	Frequency
b	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
g	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
n HT20	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz

5.6. THE WORSE CASE CONFIGURATIONS

The EUT was tested in the following configuration(s):
Controlled in test mode using a software application on the EUT supplied by customer. The application was used to enable a continuous transmission and to select the mode, test channels, bandwidth, data rates as required.

Test channels referring to section 5.2.

Maximum power setting referring to section 5.3.

Worst case Data Rates declared by the customer:

IEEE 802.11b / SISO – DBPSK / 1 Mbps
IEEE 802.11g / SISO – BPSK / 6 Mbps
IEEE 802.11n HT20 / SISO – BPSK / MCS0

For Radiated test of 802.11b and g mode, the antenna with higher output power was selected to be test.

The EUT support Cyclic Shift Diversity(CDD), Space Time Coding(STBC), Spartial Division Multiplexing(SDM) modes. They use the same conducted power per chain in any given mode, so we only chose the worst case mode CDD for final testing.

5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2412-2462	Integral Antenna	2.2
2	2412-2462	Integral Antenna	3.4

Note: Note: Directional gain= 10 log[$(10^{G1/20} + 10^{G2/20})^2/N_{ANT}$] dBi=5.83 dBi.
N_{ANT} : Antenna numbers
Note: The value of the antenna gain was declared by customer.

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	☒2TX, 2RX	ANT 1 or ANT 2 can be used as transmitting/receiving antenna.
IEEE 802.11g	☒2TX, 2RX	ANT 1 or 2 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	☒2TX, 2RX	ANT1&2 can be used as transmitting/receiving antenna.
Note: 1.For transmit simultaneously, all the modes had been tested, only the worst data for LTE & 2.4G WIFI was recorded in the LTE report.		

Note: The value of the antenna gain was declared by customer.

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
/	/	/	/	/

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	Type C	/	1.0	/

ACCESSORIES

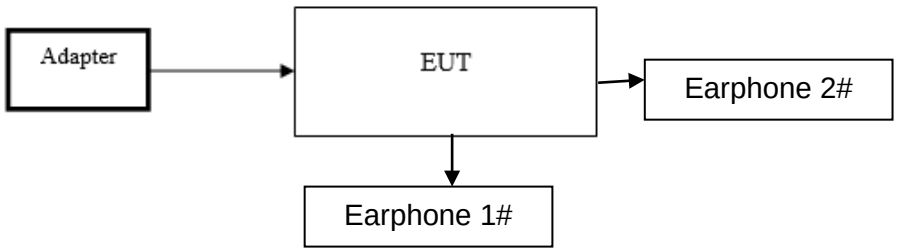
Item	Accessory	Brand Name	Model Name	Description
1	Power adapter	HUAWEI	HW-100225C00	5V2A
2	Earphone 1#	/	/	/
3	Earphone 2#	/	/	/
4	TF Card	/	/	/

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS

For Conducted Emission Test for AC Power Port test:



6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	R&S	ESR3	101961	Oct.30, 2021	Oct.29, 2022
Two-Line V-Network	R&S	ENV216	101983	Oct.30, 2021	Oct.29, 2022
Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Oct.30, 2021	Oct.29, 2022
Software					
Description			Manufacturer	Name	Version
Test Software for Conducted Emissions			Farad	EZ-EMC	Ver. UL-3A1

Radiated Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Oct.30, 2021	Oct.29, 2022
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130959	Aug.02, 2021	Aug.01, 2024
Preamplifier	HP	8447D	2944A09099	Oct.30, 2021	Oct.29, 2022
EMI Measurement Receiver	R&S	ESR26	101377	Oct.30, 2021	Oct.29, 2022
Horn Antenna	TDK	HRN-0118	130940	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Oct.30, 2021	Oct.29, 2022
Horn Antenna	Schwarzbeck	BBHA9170	697	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-2	TRS-307-00003	Oct.31, 2021	Oct.30, 2022
Preamplifier	TDK	PA-02-3	TRS-308-00002	Oct.31, 2021	Oct.30, 2022
Loop antenna	Schwarzbeck	1519B	00008	Jan.17, 2019	Jan.17,2022
Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Oct.31, 2021	Oct.30, 2022
Preamplifier	Mini-Circuits	ZX60-83LN-S+	SUP01201941	Oct.31, 2021	Oct.30, 2022
High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	Oct.31, 2021	Oct.30, 2022
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Oct.31, 2021	Oct.30, 2022
Software					

Description	Manufacturer	Name	Version
Test Software for Radiated Emissions	Farad	EZ-EMC	Ver. UL-3A1

R&S TS 8997 Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Power sensor, Power Meter	R&S	OSP120	100921	Mar.23,2021	Mar.22,2022
Vector Signal Generator	R&S	SMBV100A	261637	Oct.30, 2021	Oct.29, 2022
Signal Generator	R&S	SMB100A	178553	Oct.30, 2021	Oct.29, 2022
Signal Analyzer	R&S	FSV40	101118	Oct.30, 2021	Oct.29, 2022
Software					
Description	Manufacturer	Name	Version		
For R&S TS 8997 Test System	Rohde & Schwarz	EMC 32	10.60.10		
Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Wideband Radio Communication Tester	R&S	CMW500	155523	Oct.30, 2021	Oct.29, 2022
Wireless Connectivity Tester	R&S	CMW270	1201.0002N75-102	Sep.29, 2021	Sep.28, 2022
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Oct.30, 2021	Oct.29, 2022
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Oct.30, 2021	Oct.29, 2022
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Oct.30, 2021	Oct.29, 2022
DC power supply	Keysight	E3642A	MY55159130	Oct.30, 2021	Oct.29, 2022
Temperature & Humidity Chamber	SANMOOD	SG-80-CC-2	2088	Nov.20,2020	Nov.19,2022
Software					
Description	Manufacturer	Name	Version		
Tonsend SRD Test System	Tonsend	JS1120-3 RF Test System	2.6.77.0518		

ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

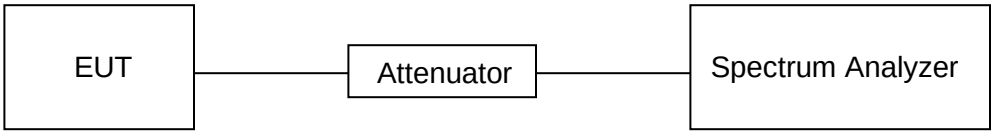
LIMITS

None; for reporting purposes only

PROCEDURE

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.8 °C	Relative Humidity	35 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix G.

6.2. 6 dB DTS BANDWIDTH AND 99 % OCCUPIED BANDWIDTH

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	≥ 500 kHz	2400-2483.5
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	For reporting purposes only.	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth and clause 6.9 for Occupied Bandwidth.

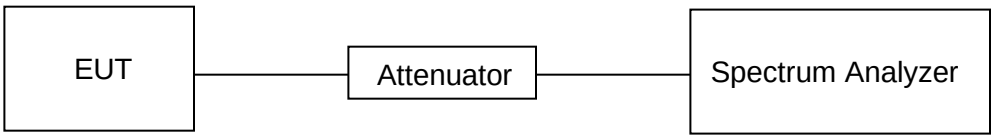
Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Frequency Span	Between 1.5 times and 5.0 times the OBW
Detector	Peak
RBW	For 6 dB Bandwidth: 100 kHz For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
VBW	For 6 dB Bandwidth: ≥3 × RBW For 99 % Occupied Bandwidth: ≥3 × RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.8 °C	Relative Humidity	35 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix A & B.

6.3. CONDUCTED OUTPUT POWER

LIMITS

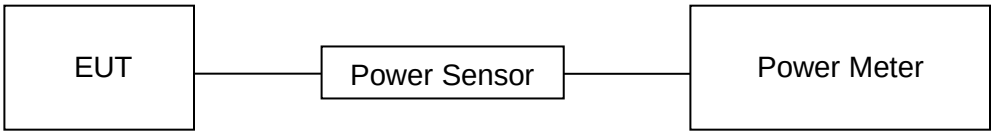
CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	Conducted Output Power	1 watt or 30 dBm	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.9.

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).
Measure peak emission level, the indicated level is the average output power, after any corrections for external attenuators and cables.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.8 °C	Relative Humidity	35 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix C.

6.4. POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm/3 kHz	2400-2483.5

TEST PROCEDURE

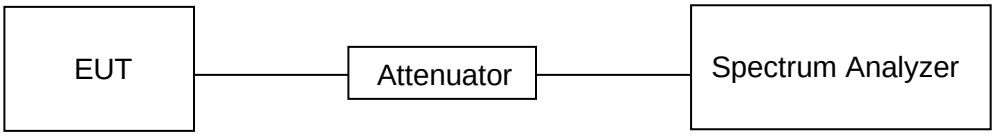
Refer to ANSI C63.10-2013 clause 11.10.

Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤ 100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.8 °C	Relative Humidity	35 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix D.

6.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

Connect the EUT to the spectrum analyzer and use the following settings for reference level measurement:

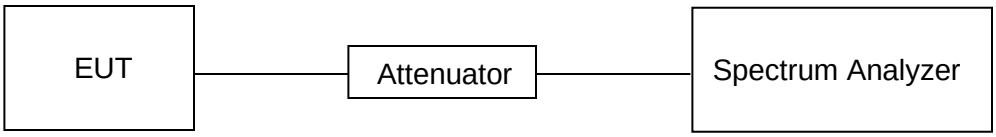
Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.
Change the settings for emission level measurement:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.8 °C	Relative Humidity	35 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix E & F.

7. RADIATED TEST RESULTS

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

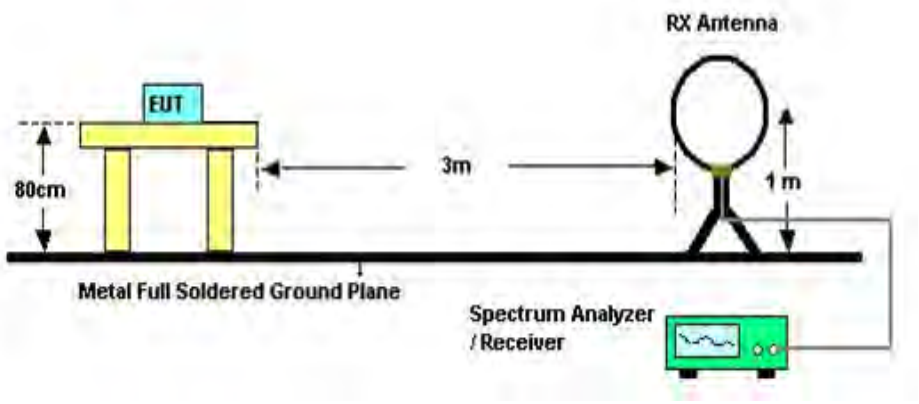
FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

TEST SETUP AND PROCEDURE

Below 30 MHz



The setting of the spectrum analyzer

RBW	200 Hz (From 9 kHz to 0.15 MHz) / 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz) / 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

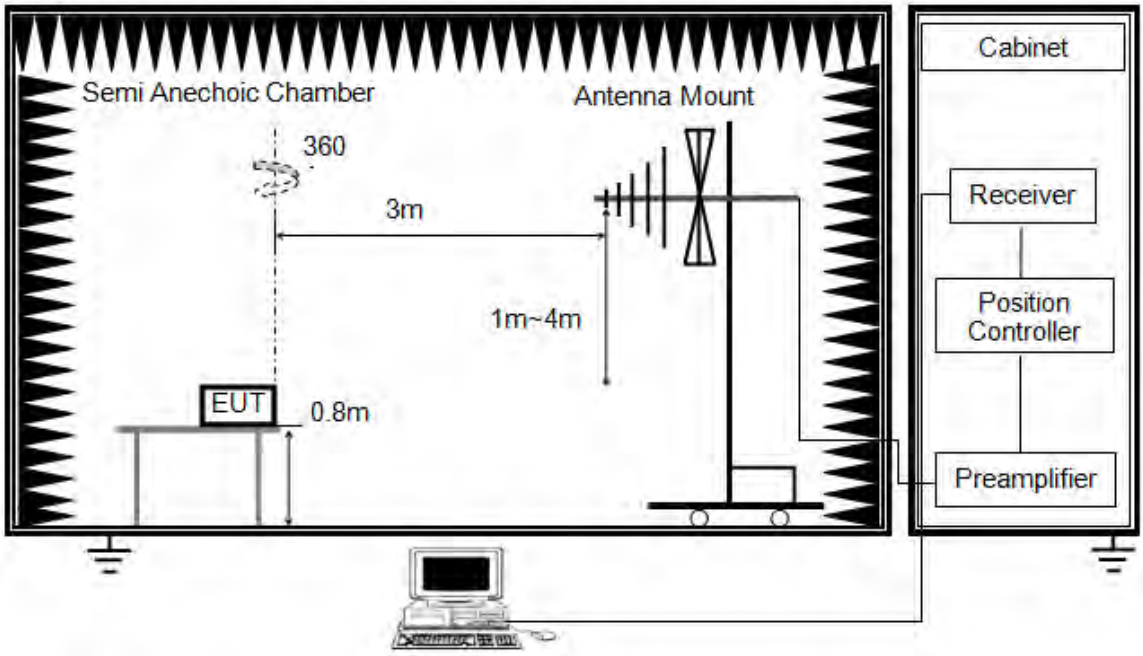
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

Below 1 GHz and above 30 MHz



The setting of the spectrum analyzer

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

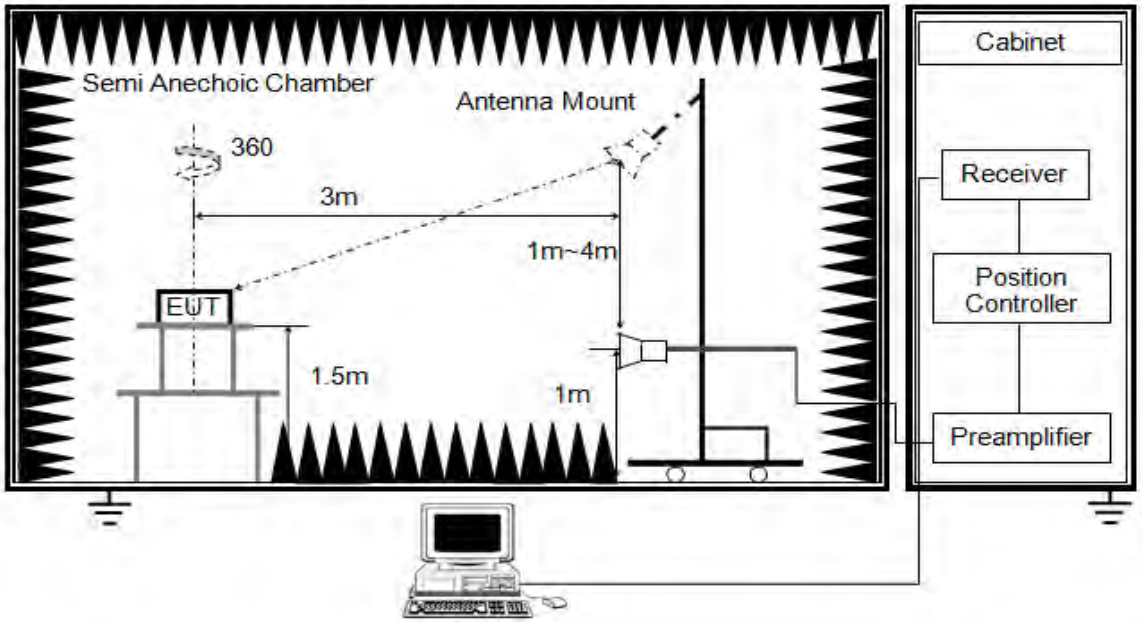
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1 GHz



The setting of the spectrum analyzer

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.

2. The EUT was arranged to its worst case and then tune the antenna tower (1- s4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

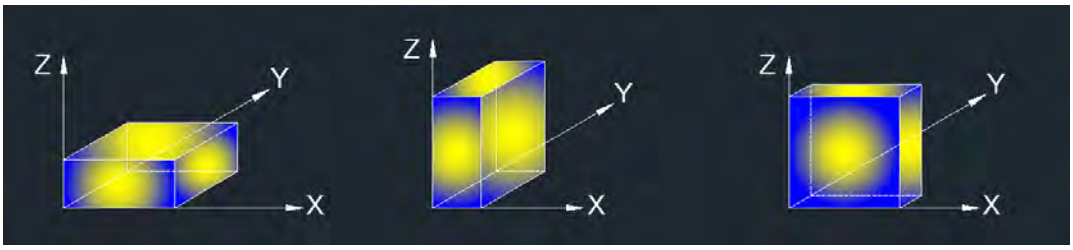
3. The EUT was placed on a turntable with 1.5 m above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Note 2: For transmit simultaneously, all the modes had been tested, only the worst data for LTE & 2.4G WIFI was recorded in the LTE report.

Note 3: The EUT was fully exercised with external accessories during the test. In the case of multiple accessory external ports, an external accessory shall be connected to one of each type of port.

TEST ENVIRONMENT

Temperature	22.5 °C	Relative Humidity	48 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

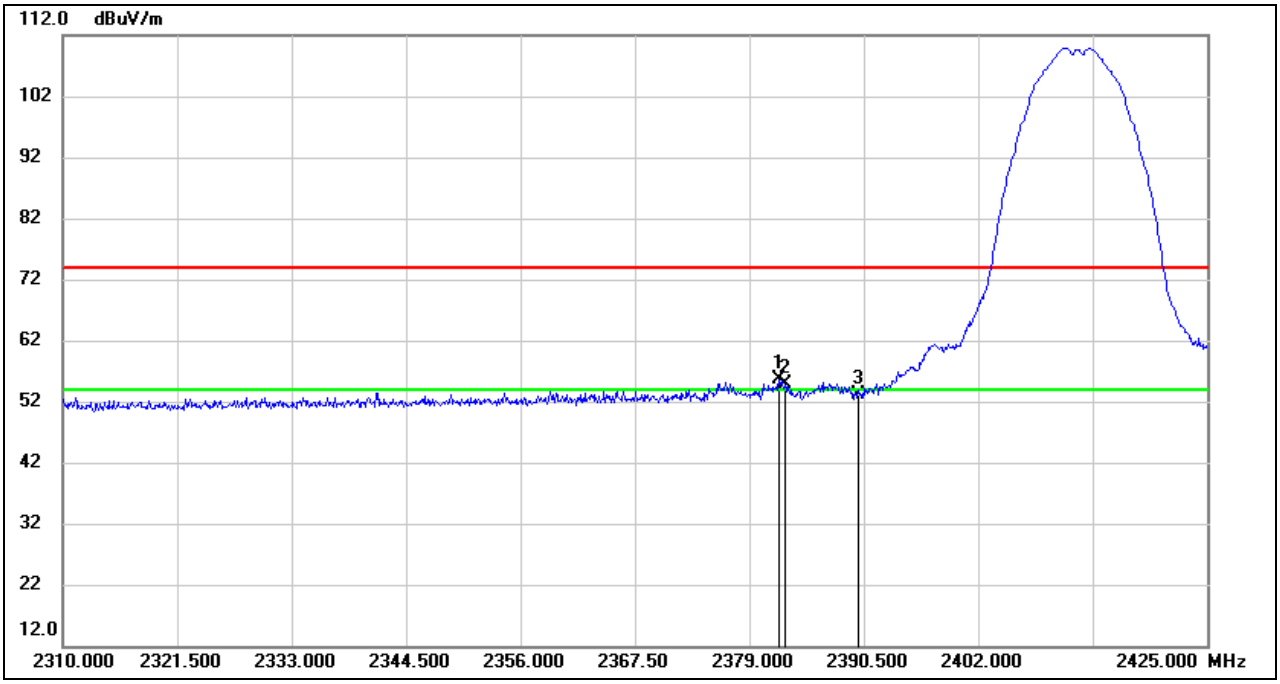
RESULTS

7.1. RESTRICTED BANDEDGE

7.1.1. 802.11b SISO MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

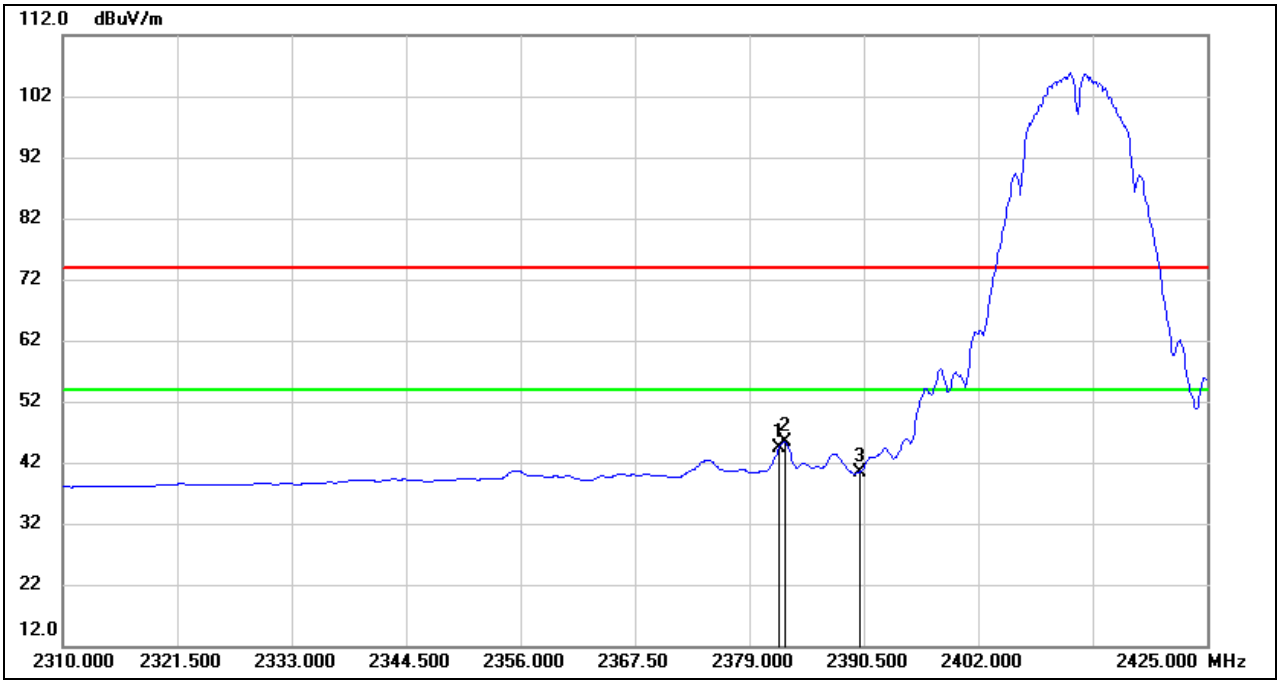
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2381.990	23.12	32.59	55.71	74.00	-18.29	peak
2	2382.565	22.16	32.60	54.76	74.00	-19.24	peak
3	2390.000	20.40	32.66	53.06	74.00	-20.94	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG

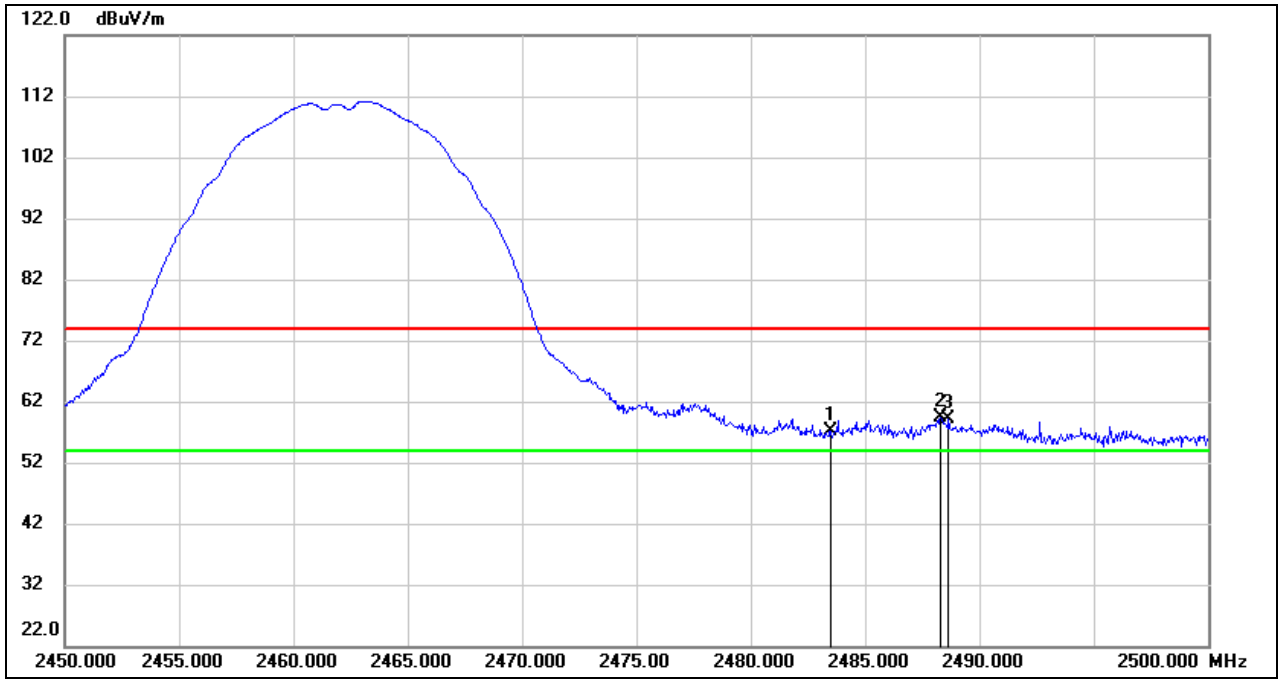


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2381.990	11.86	32.59	44.45	54.00	-9.55	AVG
2	2382.565	12.72	32.60	45.32	54.00	-8.68	AVG
3	2390.000	7.75	32.66	40.41	54.00	-13.59	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

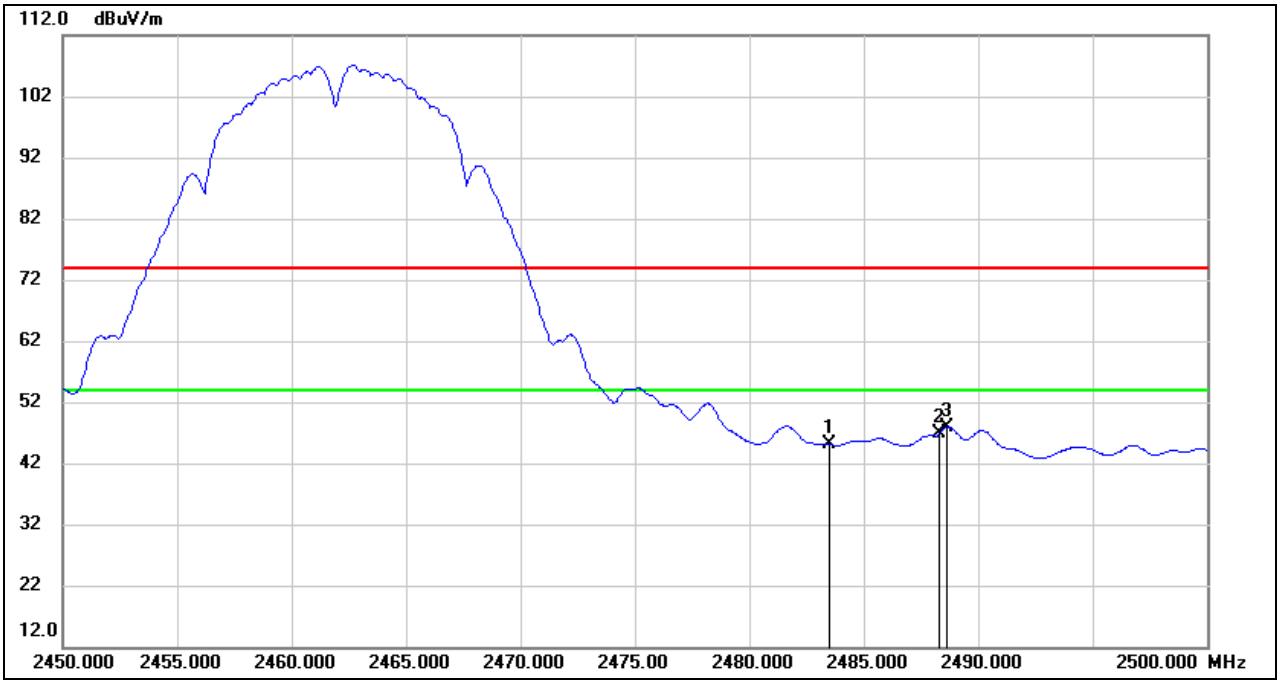
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	23.97	33.10	57.07	74.00	-16.93	peak
2	2488.300	26.17	33.11	59.28	74.00	-14.72	peak
3	2488.650	26.09	33.11	59.20	74.00	-14.80	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	12.02	33.10	45.12	54.00	-8.88	AVG
2	2488.300	13.88	33.11	46.99	54.00	-7.01	AVG
3	2488.650	14.80	33.11	47.91	54.00	-6.09	AVG

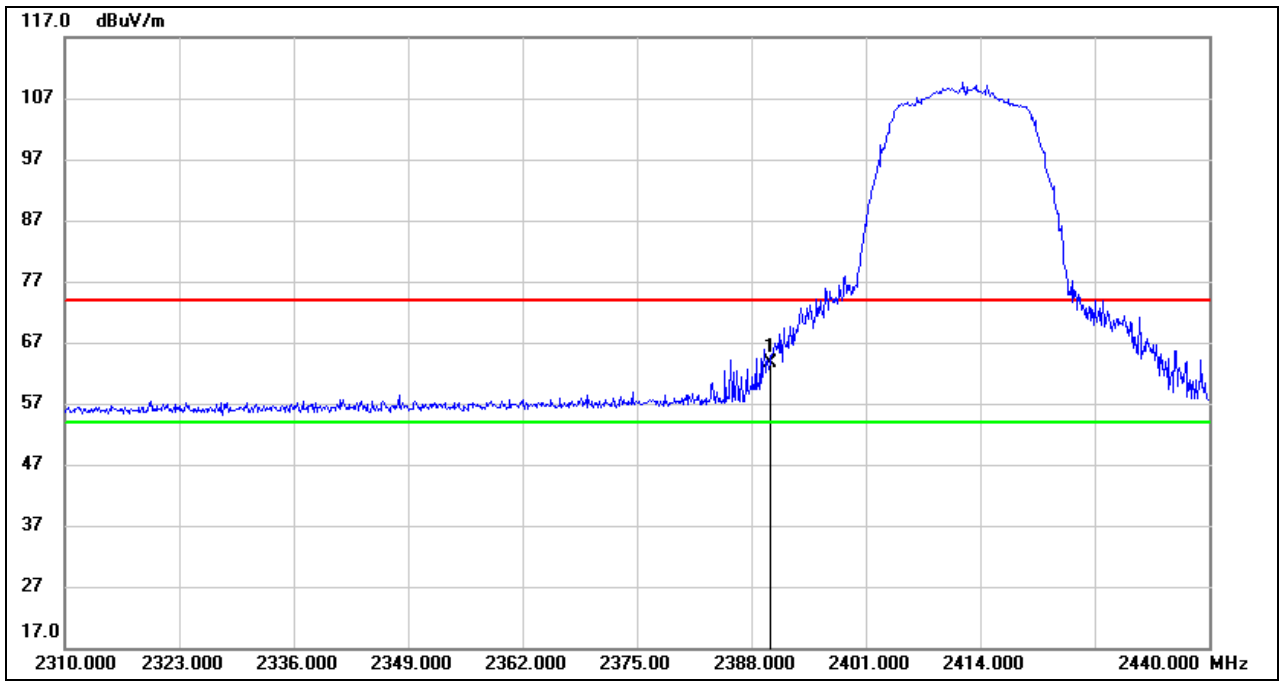
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.

7.1.2. 802.11g SISO MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

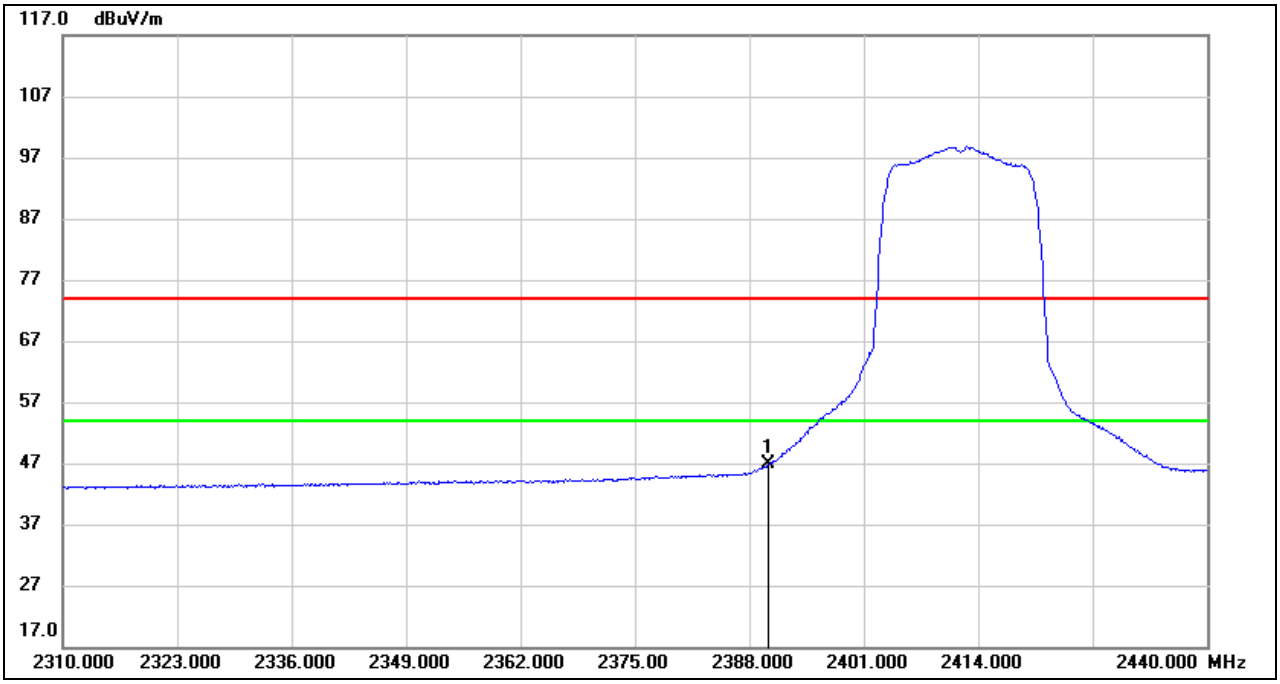
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	30.93	32.66	63.59	74.00	-10.41	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG

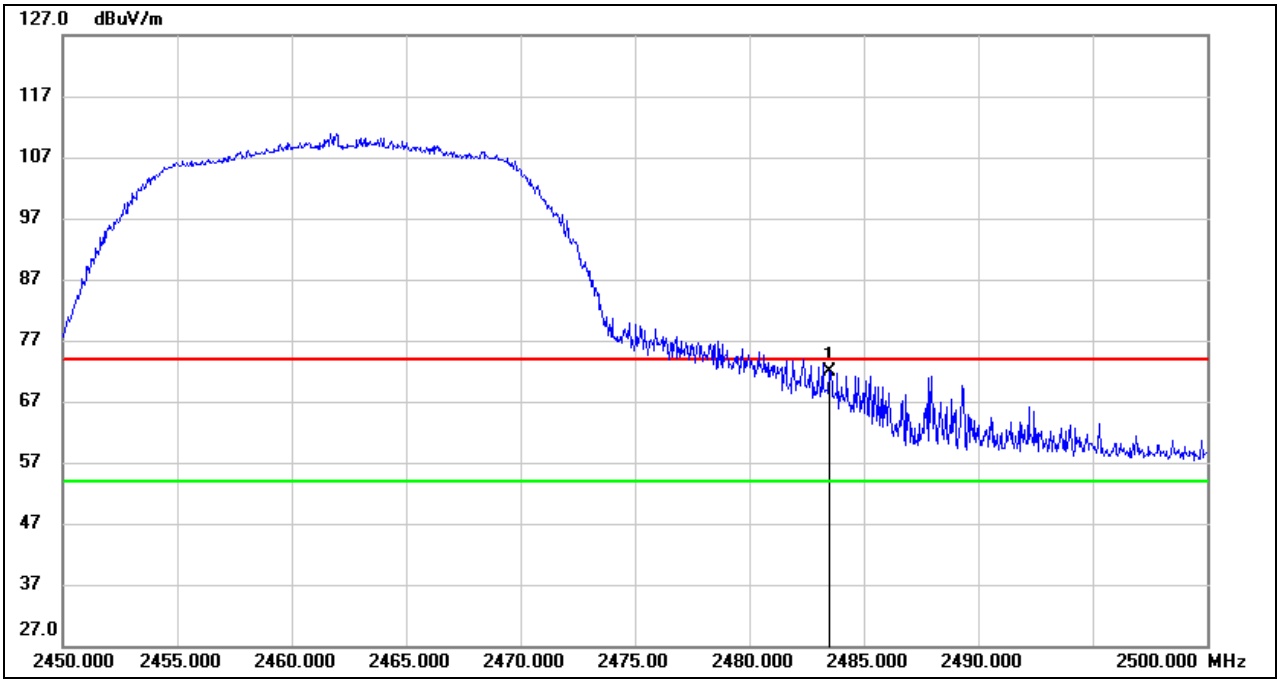


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2390.000	14.18	32.66	46.84	54.00	-7.16	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

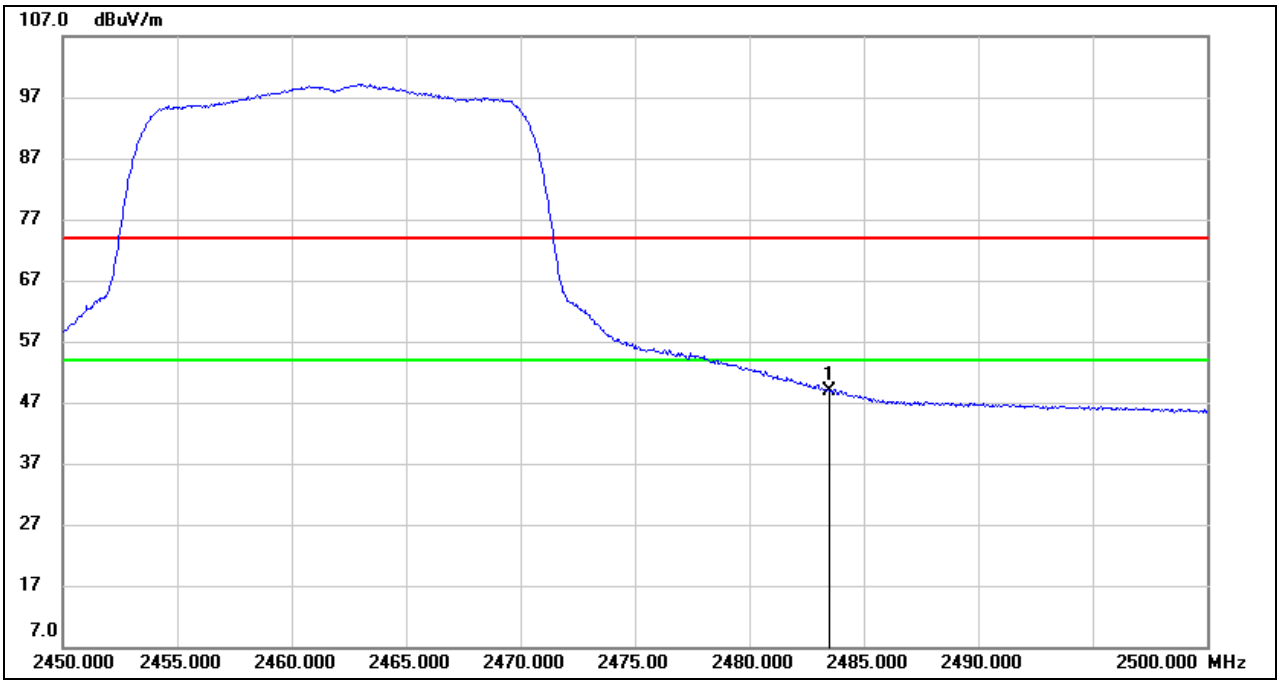
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	38.89	33.10	71.99	74.00	-2.01	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	15.87	33.10	48.97	54.00	-5.03	AVG

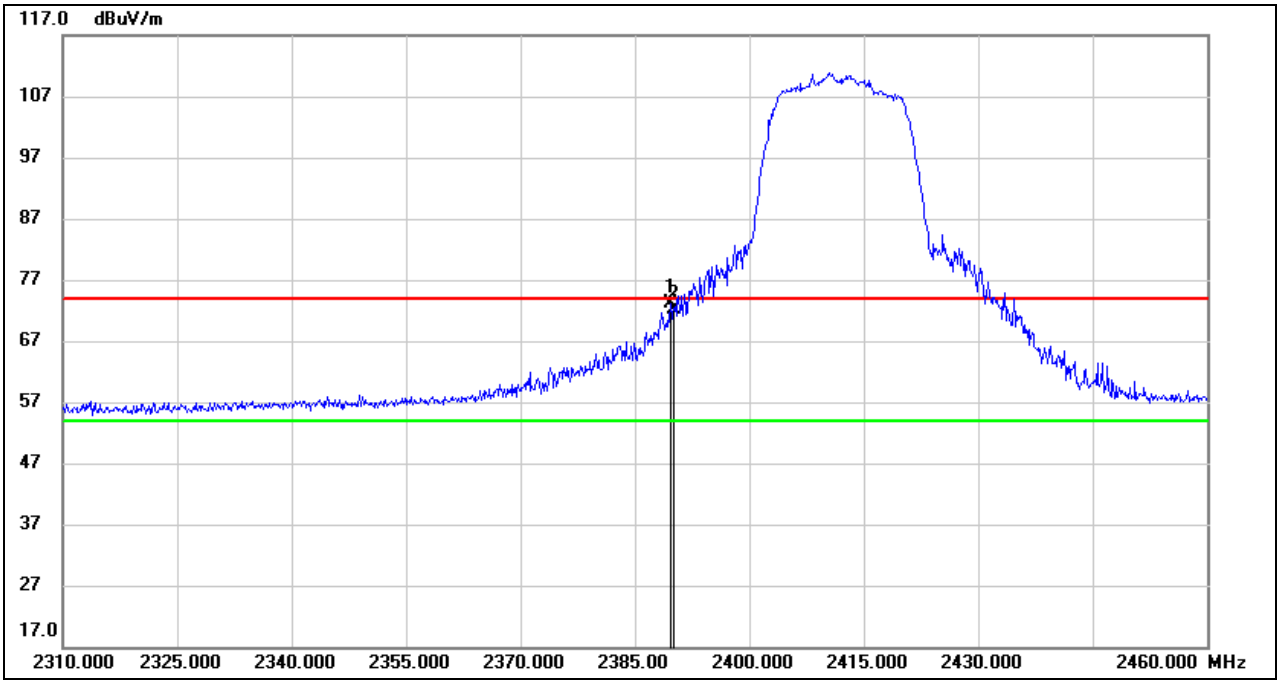
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit

Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.

7.1.3. 802.11n HT20 MIMO MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

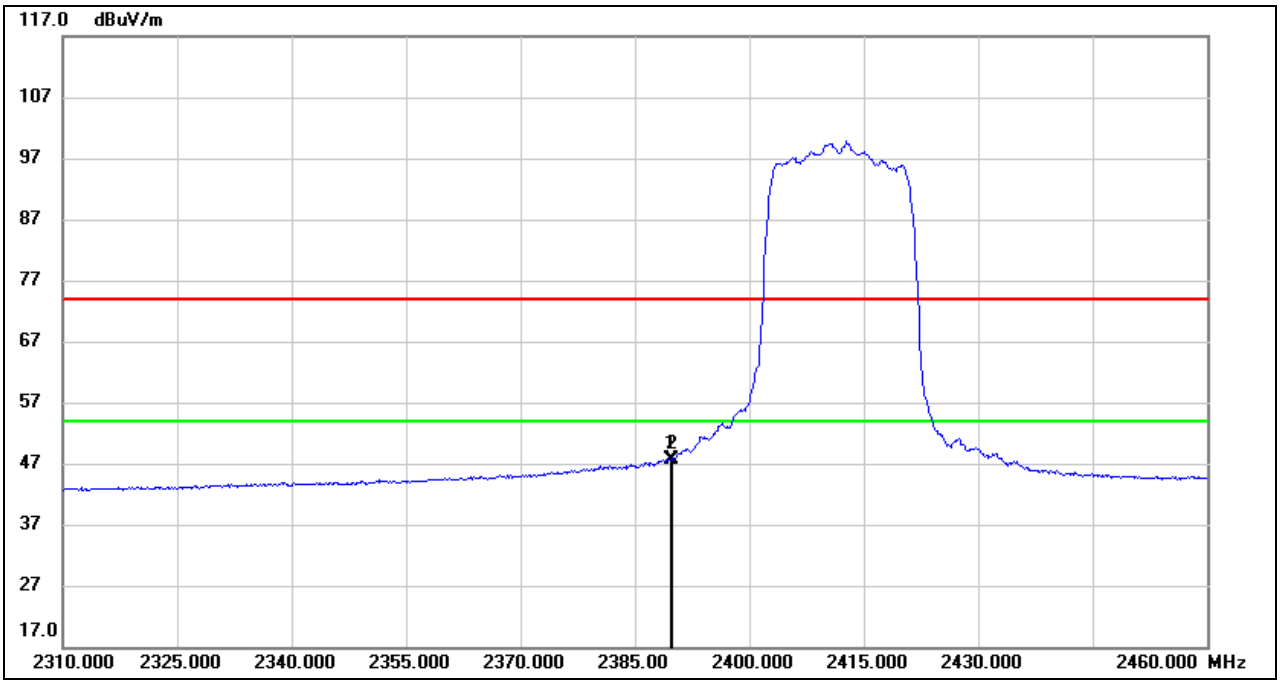
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.650	40.41	32.66	73.07	74.00	-0.93	peak
2	2390.000	39.46	32.66	72.12	74.00	-1.88	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG

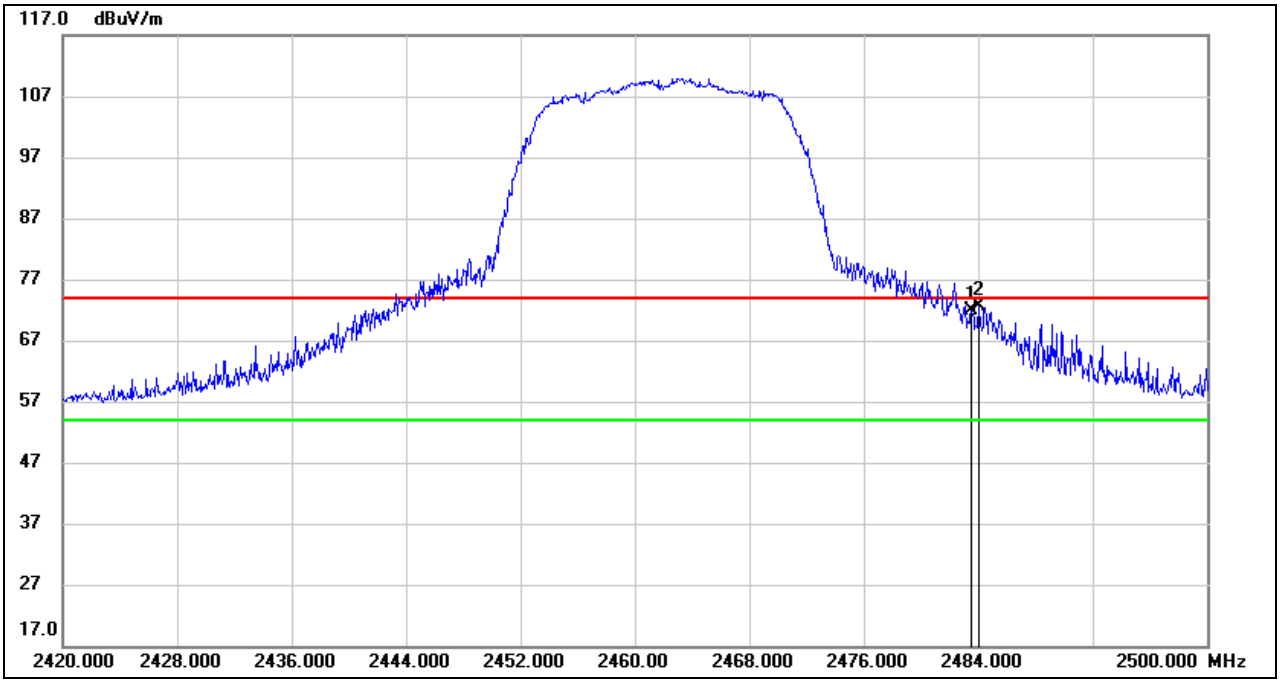


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.650	15.04	32.66	47.70	54.00	-6.30	AVG
2	2390.000	15.01	32.66	47.67	54.00	-6.33	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

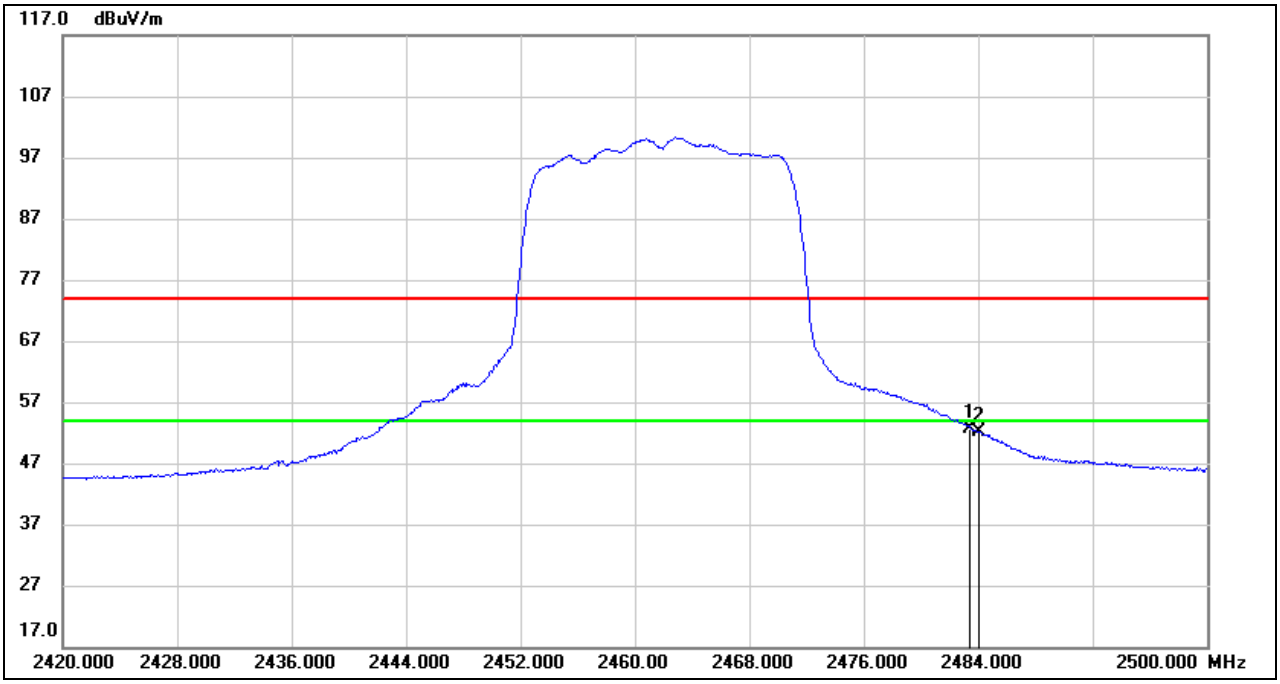
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	38.72	33.10	71.82	74.00	-2.18	peak
2	2484.000	39.44	33.10	72.54	74.00	-1.46	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	19.57	33.10	52.67	54.00	-1.33	AVG
2	2484.000	18.93	33.10	52.03	54.00	-1.97	AVG

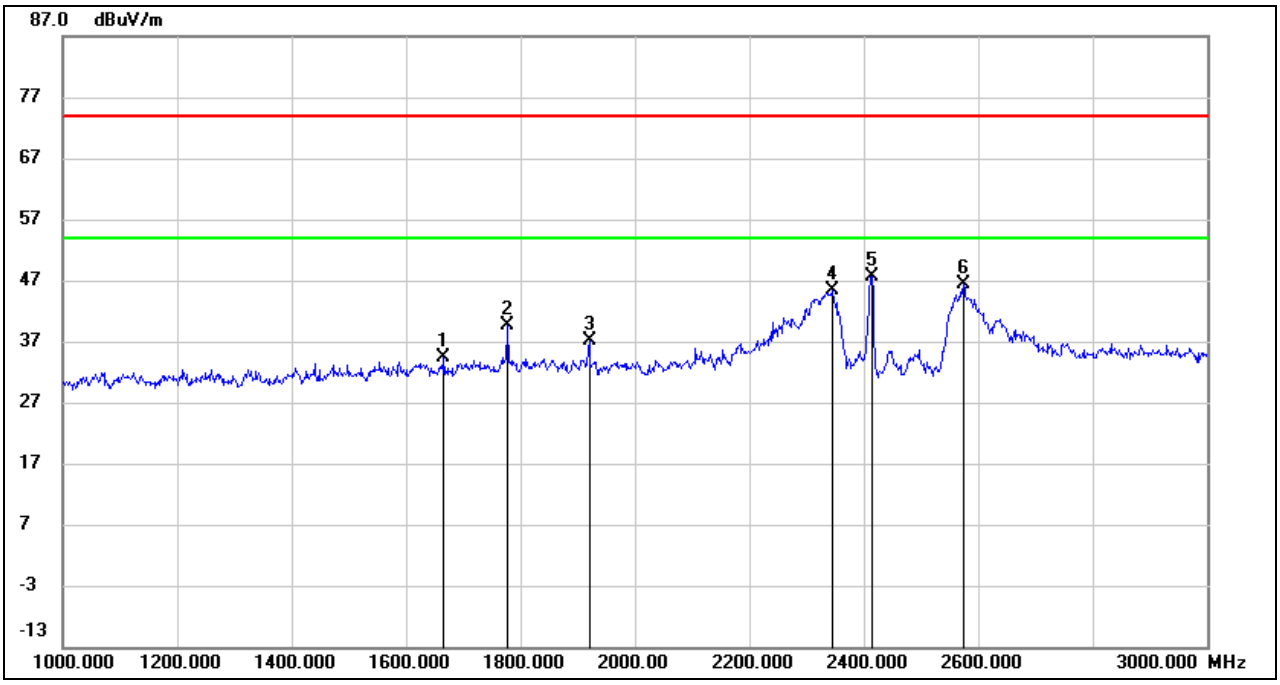
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: All the polarities (vertical and horizontal) had been tested, only the worst data was recorded in the report.

7.2. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz)

7.2.1. 802.11b SISO MODE

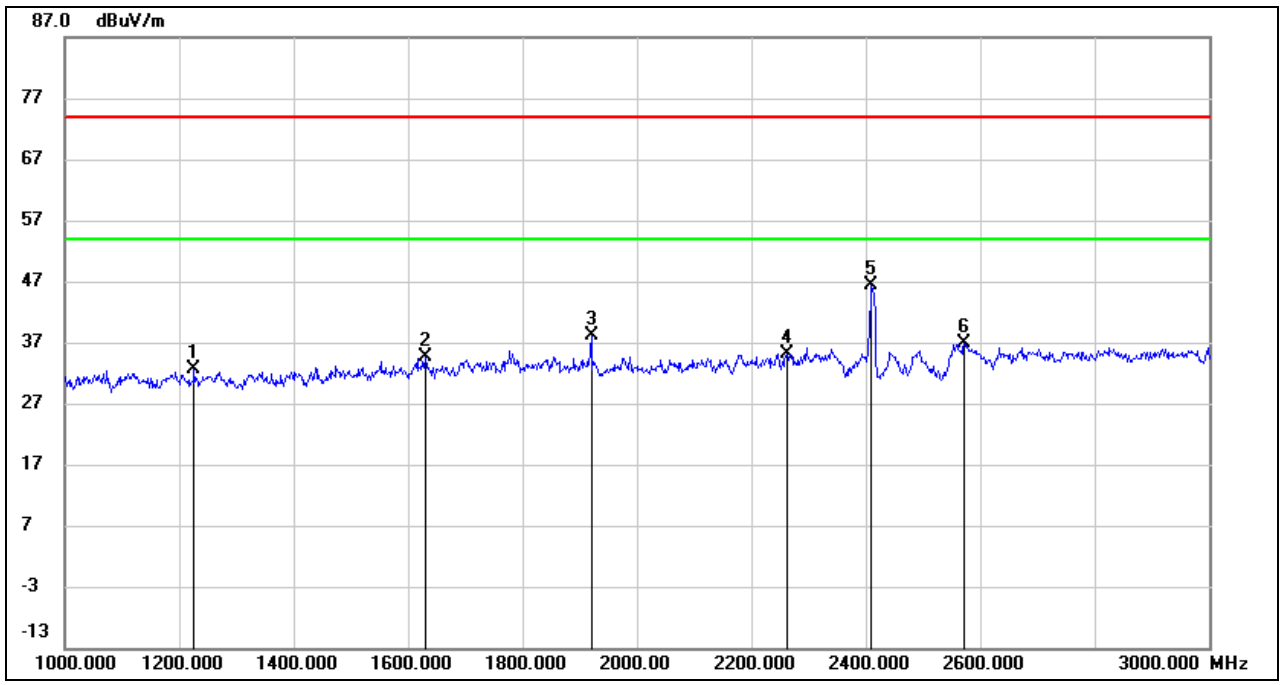
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1666.000	45.85	-11.59	34.26	74.00	-39.74	peak
2	1778.000	50.53	-10.90	39.63	74.00	-34.37	peak
3	1920.000	48.06	-11.02	37.04	74.00	-36.96	peak
4	2345.000	54.66	-9.30	45.36	74.00	-28.64	peak
5	2412.000	56.62	-9.03	47.59	/	/	Fundamental
6	2574.000	55.01	-8.69	46.32	74.00	-27.68	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector
4. The Band Reject filter loss factor already add into the correct factor.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

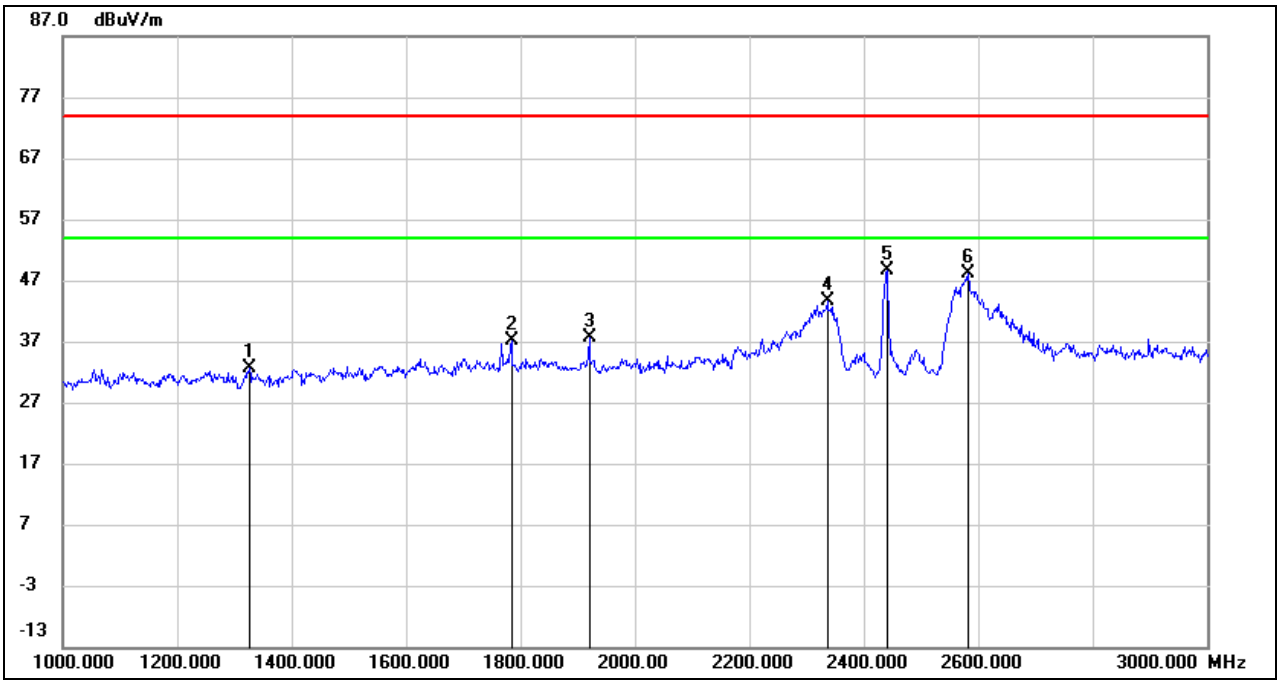
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1227.000	46.38	-13.69	32.69	74.00	-41.31	peak
2	1631.000	46.55	-11.81	34.74	74.00	-39.26	peak
3	1920.000	49.16	-11.02	38.14	74.00	-35.86	peak
4	2263.000	44.69	-9.64	35.05	74.00	-38.95	peak
5	2412.000	55.32	-9.05	46.27	/	/	Fundamental
6	2573.000	45.60	-8.69	36.91	74.00	-37.09	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The Band Reject filter loss factor already add into the correct factor.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

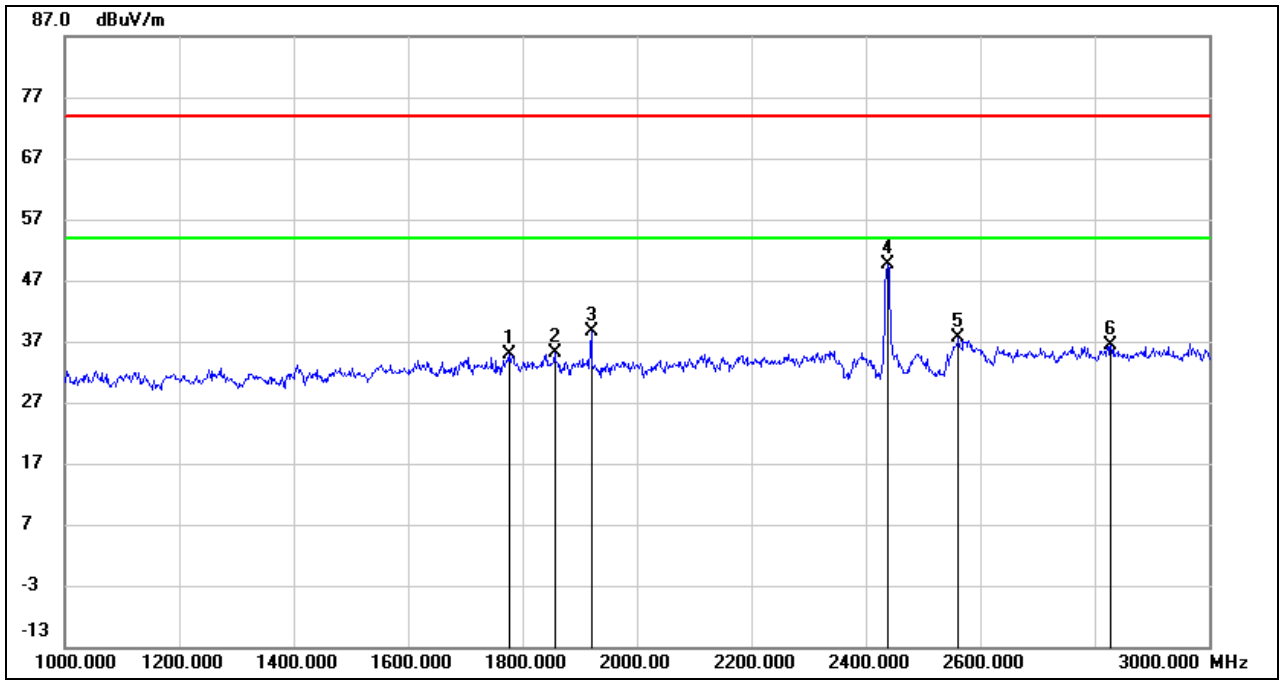
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1326.000	45.96	-13.39	32.57	74.00	-41.43	peak
2	1784.000	48.10	-10.86	37.24	74.00	-36.76	peak
3	1920.000	48.66	-11.02	37.64	74.00	-36.36	peak
4	2336.000	52.95	-9.34	43.61	74.00	-30.39	peak
5	2437.000	57.53	-8.97	48.56	/	/	Fundamental
6	2582.000	56.83	-8.67	48.16	74.00	-25.84	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The Band Reject filter loss factor already add into the correct factor.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

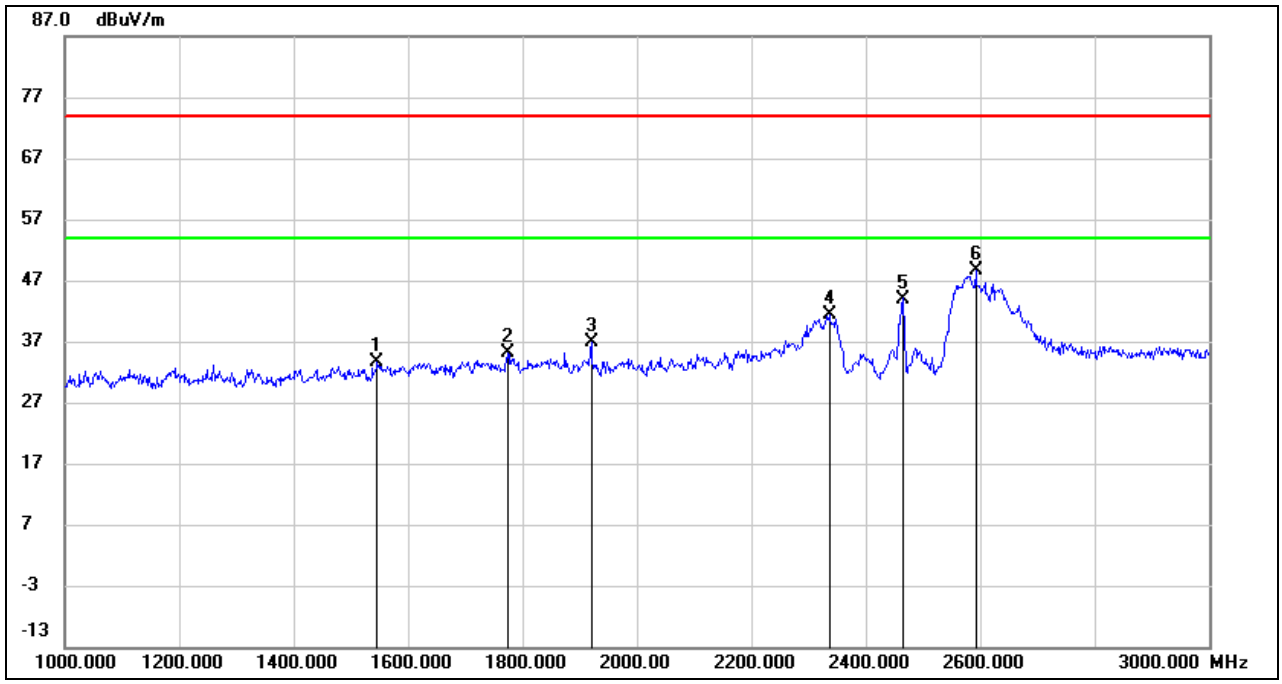
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1777.000	45.74	-10.91	34.83	74.00	-39.17	peak
2	1856.000	45.93	-10.89	35.04	74.00	-38.96	peak
3	1920.000	49.66	-11.02	38.64	74.00	-35.36	peak
4	2437.000	58.57	-8.98	49.59	/	/	Fundamental
5	2562.000	46.24	-8.71	37.53	74.00	-36.47	peak
6	2828.000	43.92	-7.61	36.31	74.00	-37.69	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The Band Reject filter loss factor already add into the correct factor.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)

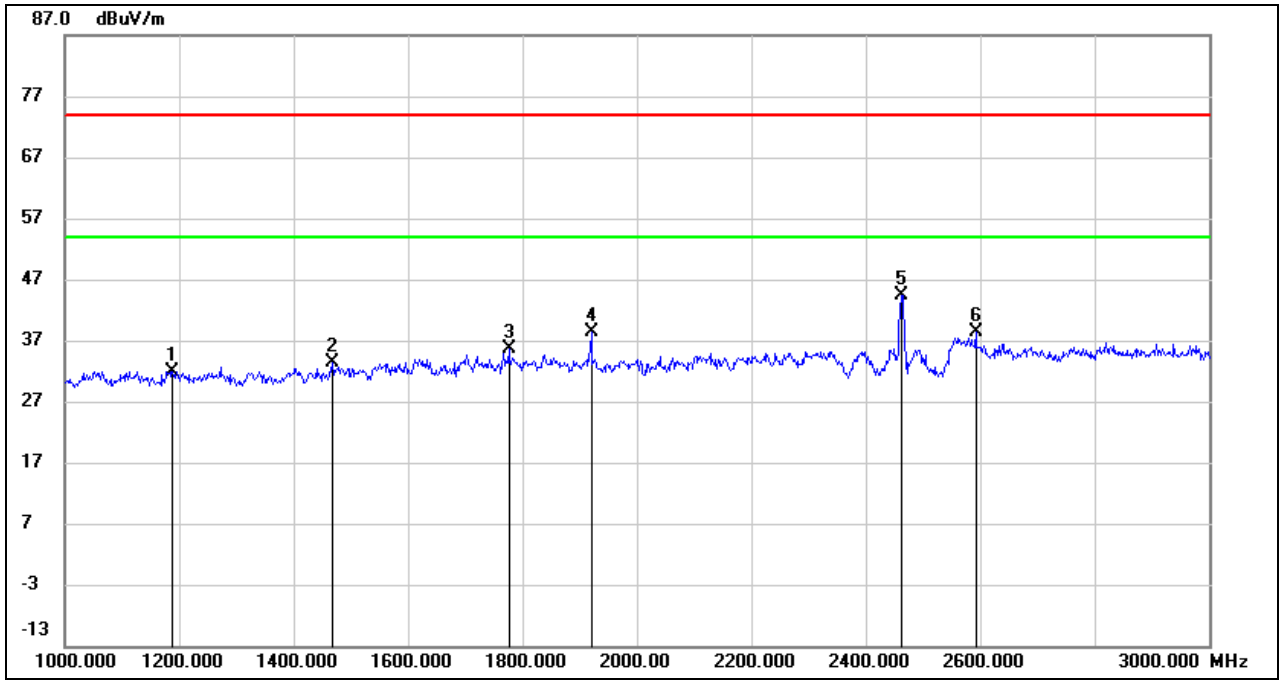


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1546.000	45.85	-12.28	33.57	74.00	-40.43	peak
2	1775.000	45.98	-10.92	35.06	74.00	-38.94	peak
3	1920.000	47.80	-11.02	36.78	74.00	-37.22	peak
4	2337.000	50.75	-9.33	41.42	74.00	-32.58	peak
5	2462.000	52.90	-8.90	44.00	/	/	Fundamental
6	2592.000	57.28	-8.65	48.63	74.00	-25.37	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The Band Reject filter loss factor already add into the correct factor.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1188.000	45.84	-13.85	31.99	74.00	-42.01	peak
2	1469.000	46.00	-12.73	33.27	74.00	-40.73	peak
3	1777.000	46.55	-10.91	35.64	74.00	-38.36	peak
4	1920.000	49.31	-11.02	38.29	74.00	-35.71	peak
5	2462.000	53.33	-8.92	44.41	/	/	Fundamental
6	2593.000	46.91	-8.65	38.26	74.00	-35.74	peak

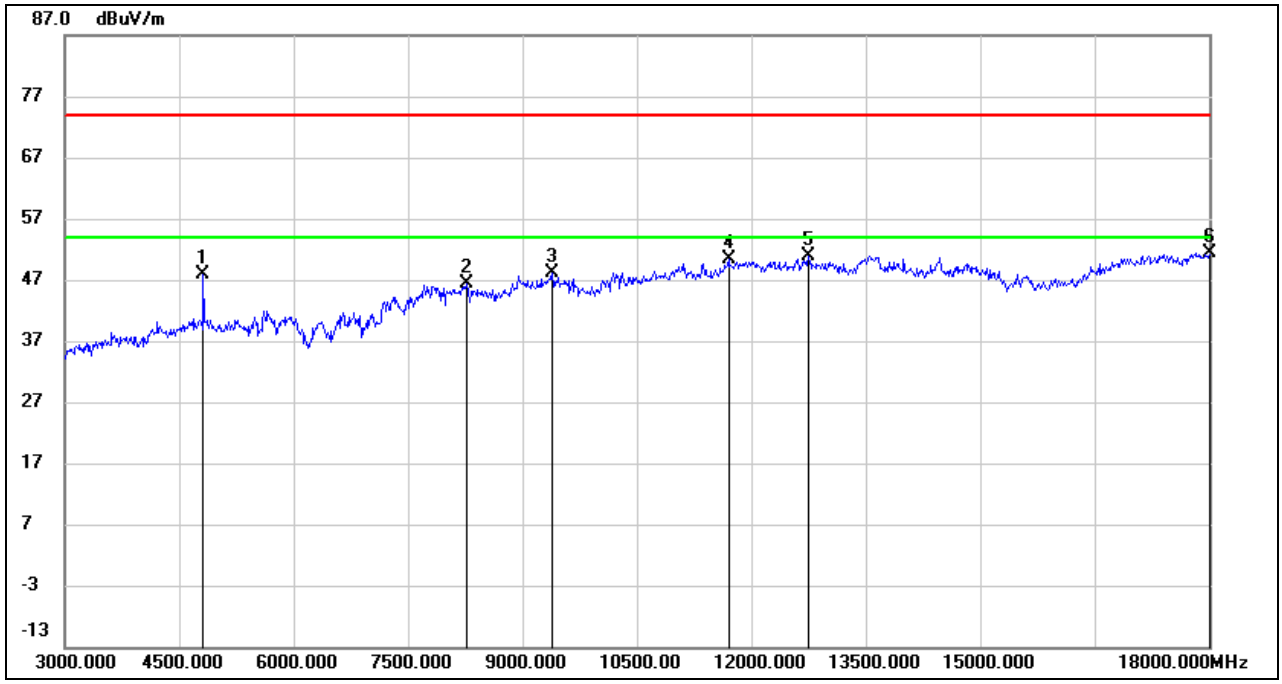
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The Band Reject filter loss factor already add into the correct factor.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

Note: All the modes and channels had been tested, but only the worst data was recorded in the report.

7.3. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz)

7.3.1. 802.11b SISO MODE

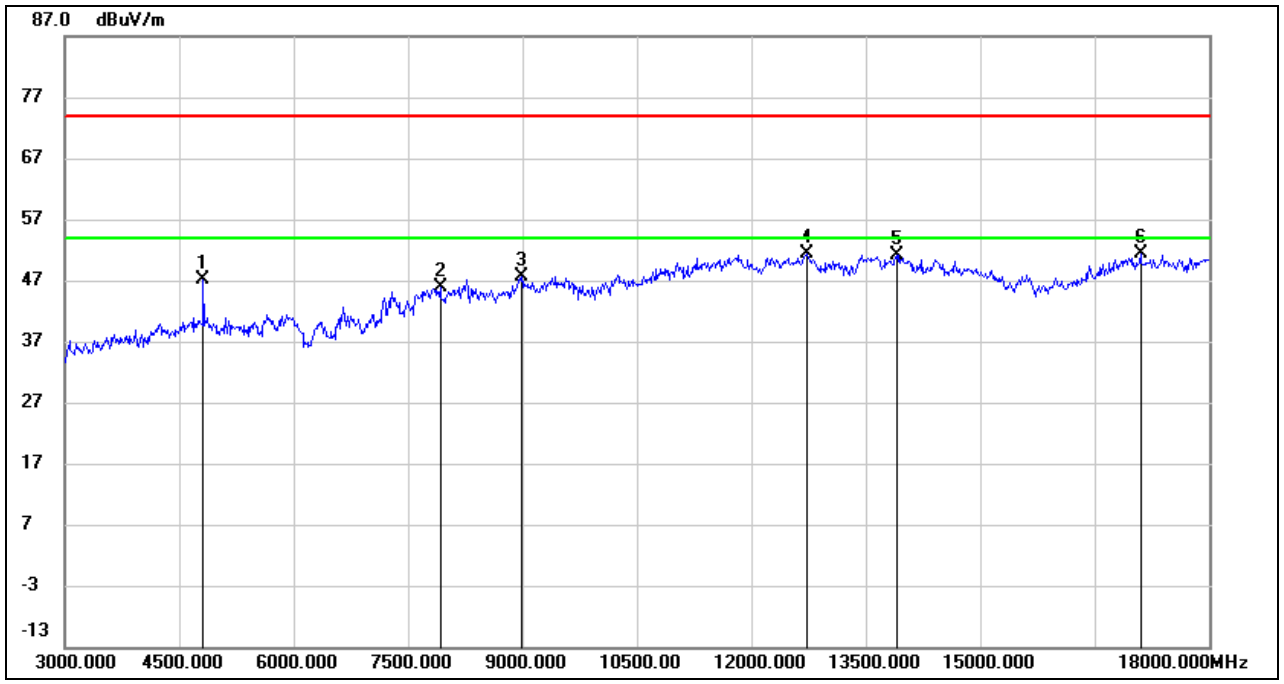
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4822.500	48.53	-0.64	47.89	74.00	-26.11	peak
2	8265.000	37.85	8.45	46.30	74.00	-27.70	peak
3	9390.000	38.09	10.07	48.16	74.00	-25.84	peak
4	11707.500	33.41	16.86	50.27	74.00	-23.73	peak
5	12750.000	34.02	16.96	50.98	74.00	-23.02	peak
6	18000.000	27.93	23.37	51.30	74.00	-22.70	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

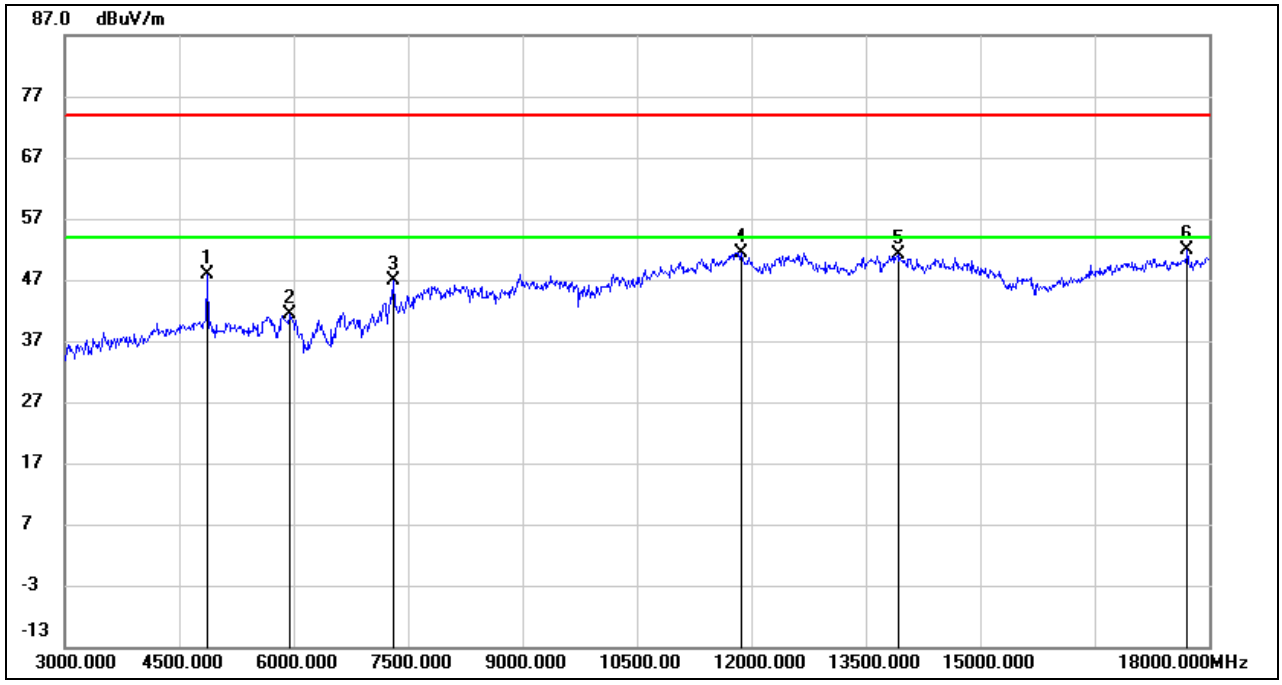
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4822.500	47.89	-0.64	47.25	74.00	-26.75	peak
2	7927.500	38.71	7.26	45.97	74.00	-28.03	peak
3	8985.000	37.57	9.96	47.53	74.00	-26.47	peak
4	12735.000	34.52	16.92	51.44	74.00	-22.56	peak
5	13912.500	32.56	18.65	51.21	74.00	-22.79	peak
6	17107.500	32.13	19.18	51.31	74.00	-22.69	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

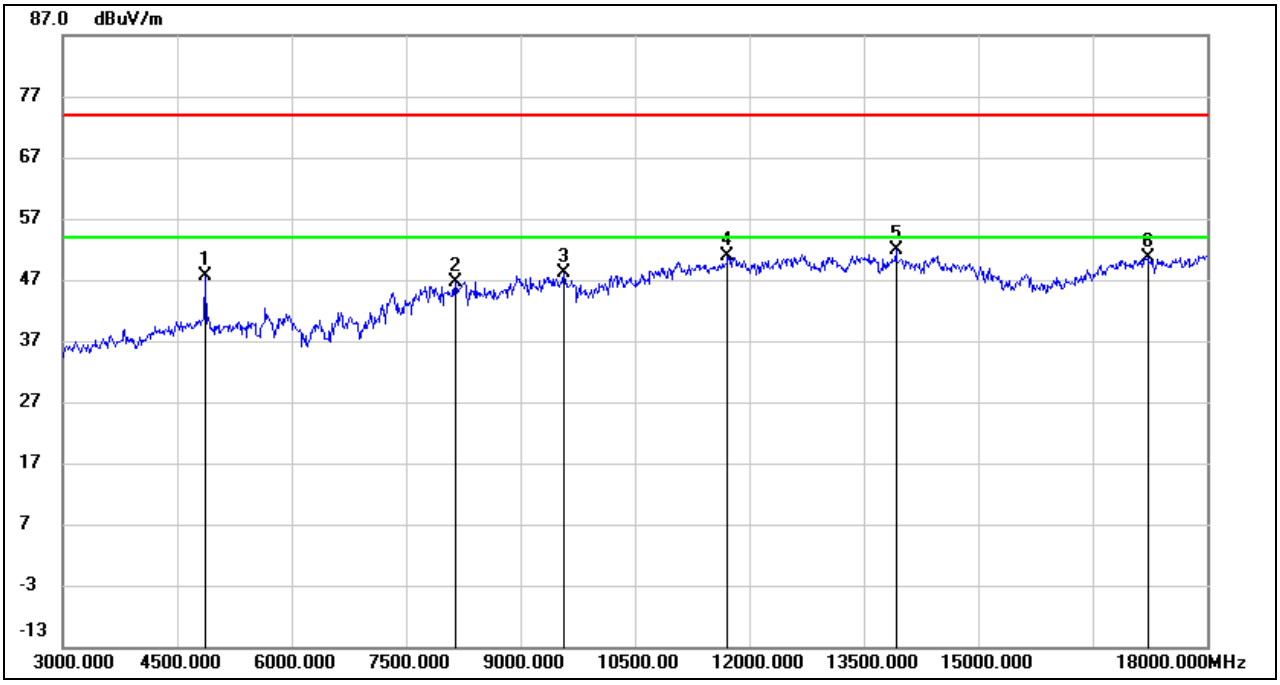
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4875.000	48.50	-0.59	47.91	74.00	-26.09	peak
2	5962.500	39.27	2.06	41.33	74.00	-32.67	peak
3	7312.500	40.25	6.60	46.85	74.00	-27.15	peak
4	11865.000	34.21	17.24	51.45	74.00	-22.55	peak
5	13920.000	32.53	18.64	51.17	74.00	-22.83	peak
6	17715.000	29.88	21.96	51.84	74.00	-22.16	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

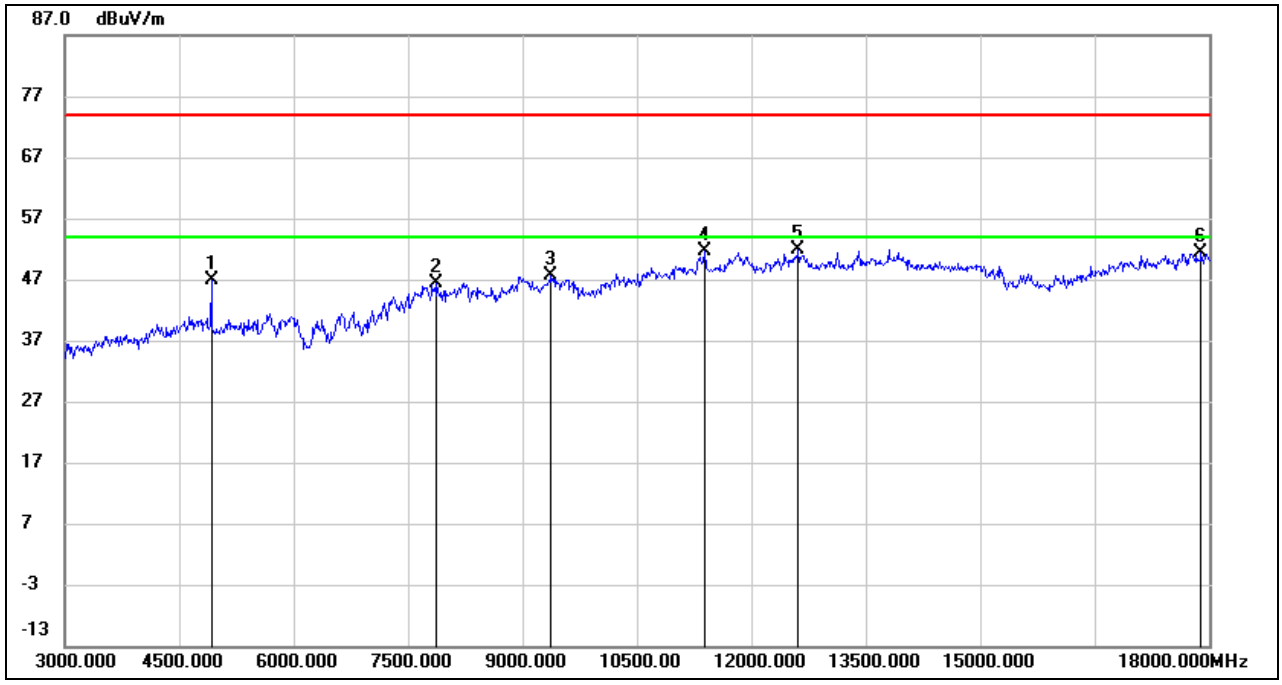
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4867.500	48.24	-0.61	47.63	74.00	-26.37	peak
2	8145.000	38.44	8.26	46.70	74.00	-27.30	peak
3	9577.500	37.59	10.47	48.06	74.00	-25.94	peak
4	11715.000	34.05	16.90	50.95	74.00	-23.05	peak
5	13920.000	33.22	18.64	51.86	74.00	-22.14	peak
6	17220.000	30.96	19.75	50.71	74.00	-23.29	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

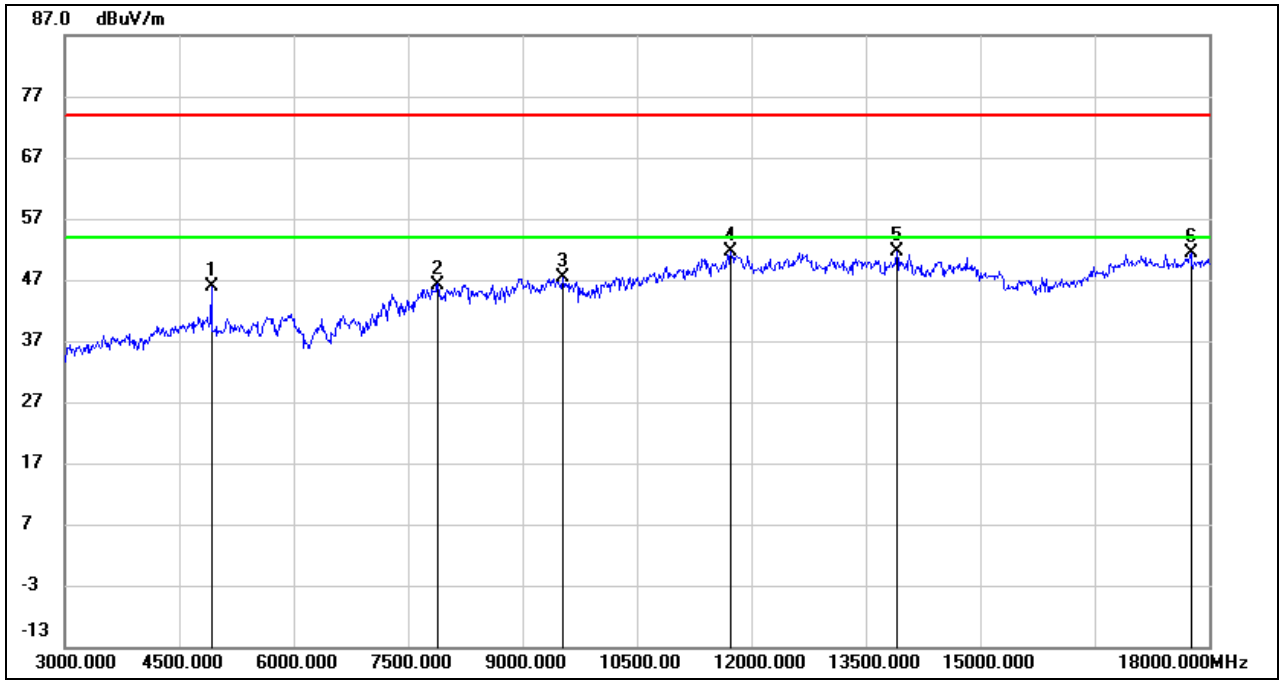
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	47.35	-0.56	46.79	74.00	-27.21	peak
2	7875.000	38.90	7.40	46.30	74.00	-27.70	peak
3	9382.500	37.51	10.03	47.54	74.00	-26.46	peak
4	11385.000	35.93	15.77	51.70	74.00	-22.30	peak
5	12615.000	35.23	16.66	51.89	74.00	-22.11	peak
6	17902.500	28.15	23.12	51.27	74.00	-22.73	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

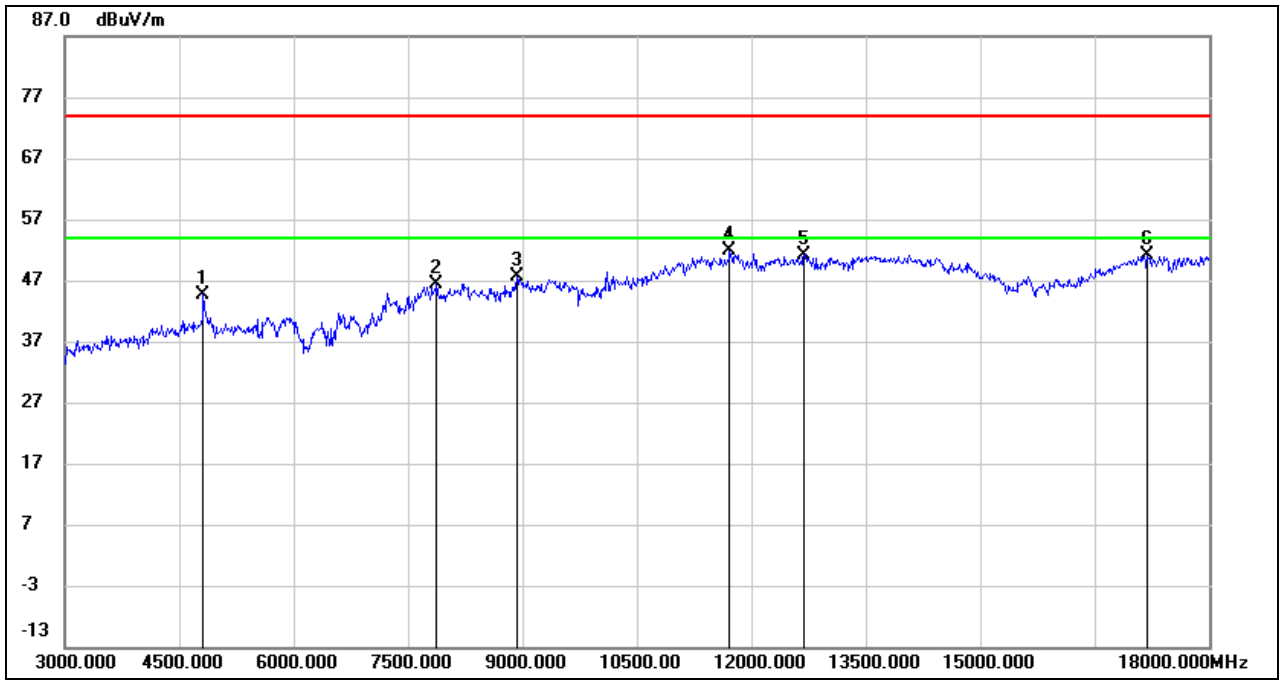


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	46.38	-0.56	45.82	74.00	-28.18	peak
2	7890.000	38.89	7.36	46.25	74.00	-27.75	peak
3	9532.500	36.94	10.40	47.34	74.00	-26.66	peak
4	11737.500	34.51	17.02	51.53	74.00	-22.47	peak
5	13912.500	32.96	18.65	51.61	74.00	-22.39	peak
6	17760.000	29.00	22.44	51.44	74.00	-22.56	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

7.3.2. 802.11g SISO MODE

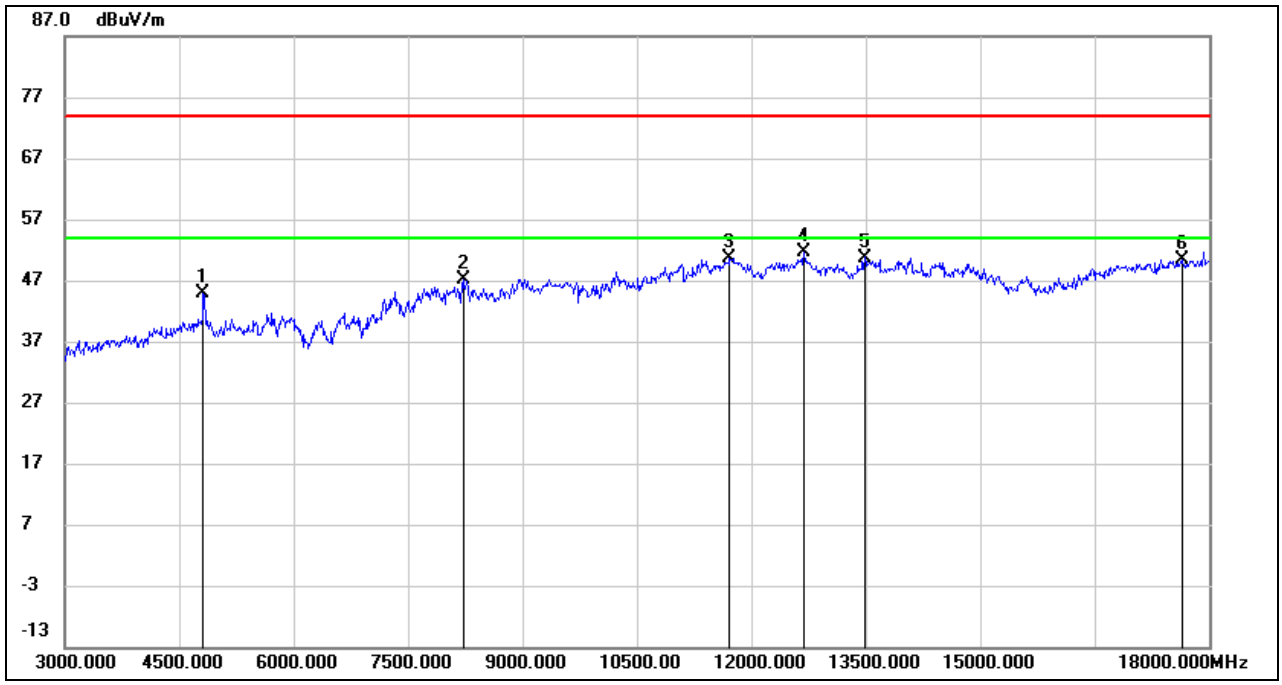
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4822.500	45.39	-0.64	44.75	74.00	-29.25	peak
2	7875.000	38.95	7.40	46.35	74.00	-27.65	peak
3	8932.500	38.27	9.39	47.66	74.00	-26.34	peak
4	11715.000	35.06	16.90	51.96	74.00	-22.04	peak
5	12697.500	34.40	16.85	51.25	74.00	-22.75	peak
6	17190.000	31.44	19.68	51.12	74.00	-22.88	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

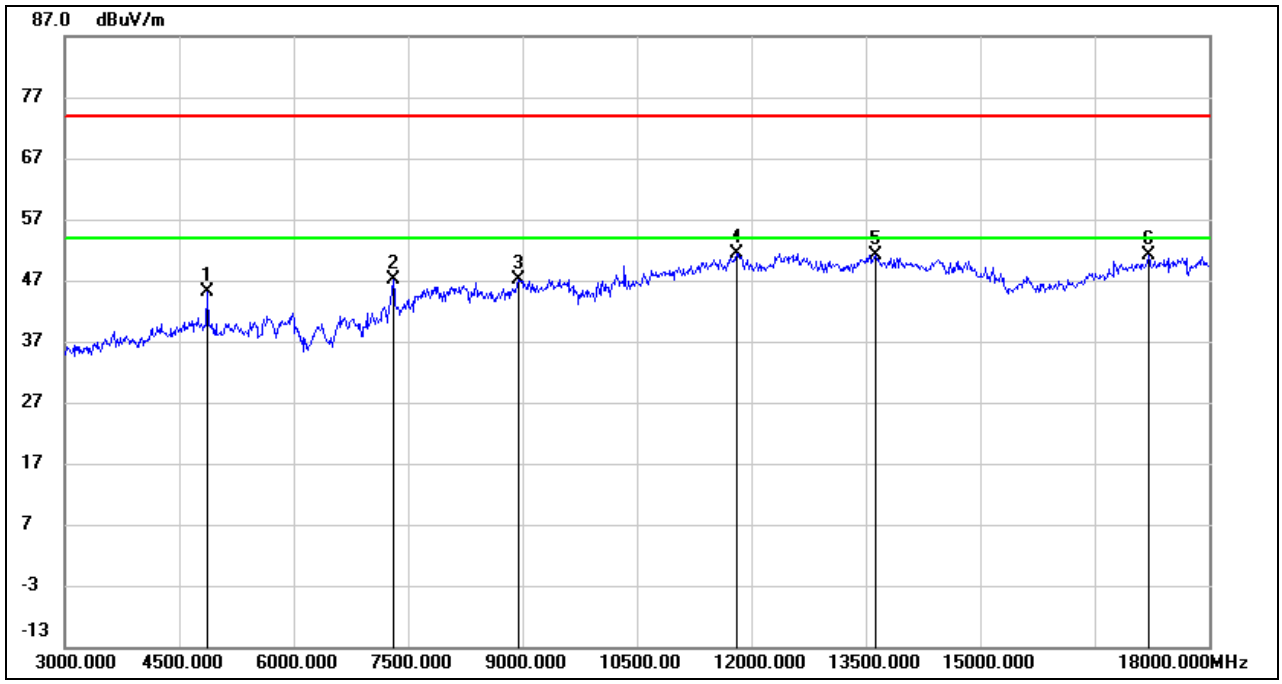
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4822.500	45.51	-0.64	44.87	74.00	-29.13	peak
2	8227.500	38.46	8.61	47.07	74.00	-26.93	peak
3	11722.500	33.73	16.94	50.67	74.00	-23.33	peak
4	12697.500	34.86	16.85	51.71	74.00	-22.29	peak
5	13492.500	32.35	18.40	50.75	74.00	-23.25	peak
6	17647.500	29.23	21.24	50.47	74.00	-23.53	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

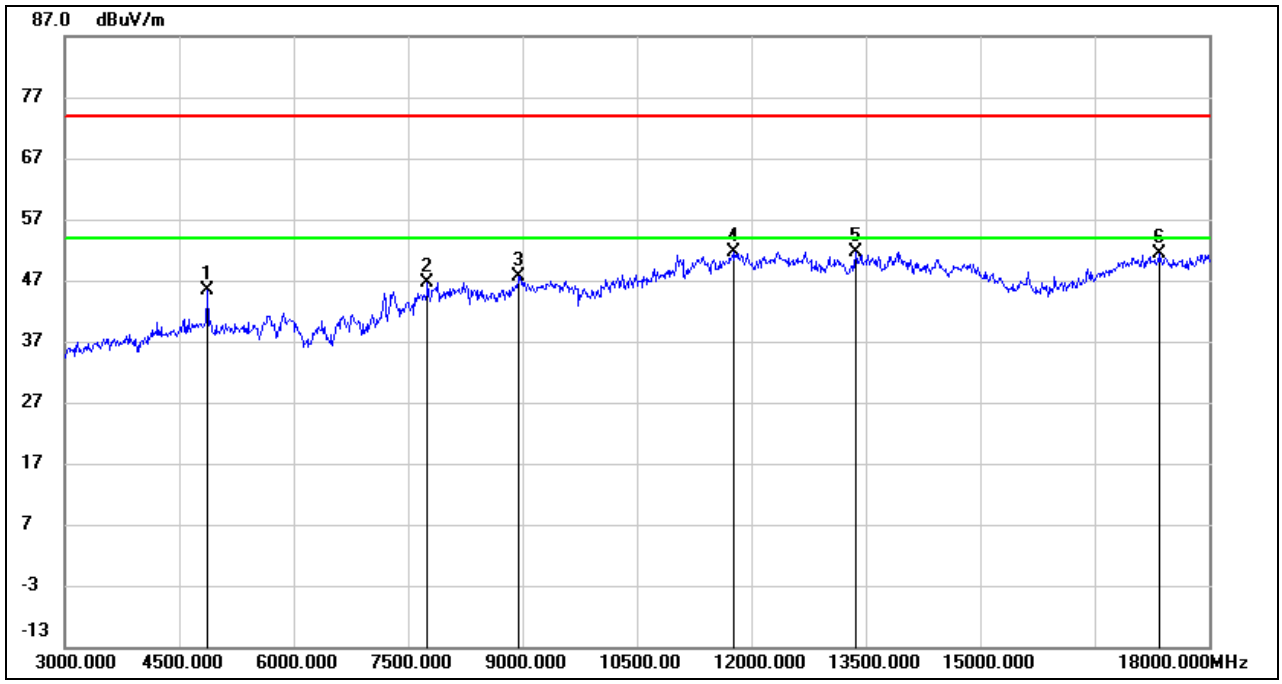
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4867.500	45.78	-0.61	45.17	74.00	-28.83	peak
2	7305.000	40.47	6.56	47.03	74.00	-26.97	peak
3	8940.000	37.72	9.47	47.19	74.00	-26.81	peak
4	11812.500	34.16	17.33	51.49	74.00	-22.51	peak
5	13642.500	32.67	18.45	51.12	74.00	-22.88	peak
6	17212.500	31.49	19.75	51.24	74.00	-22.76	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

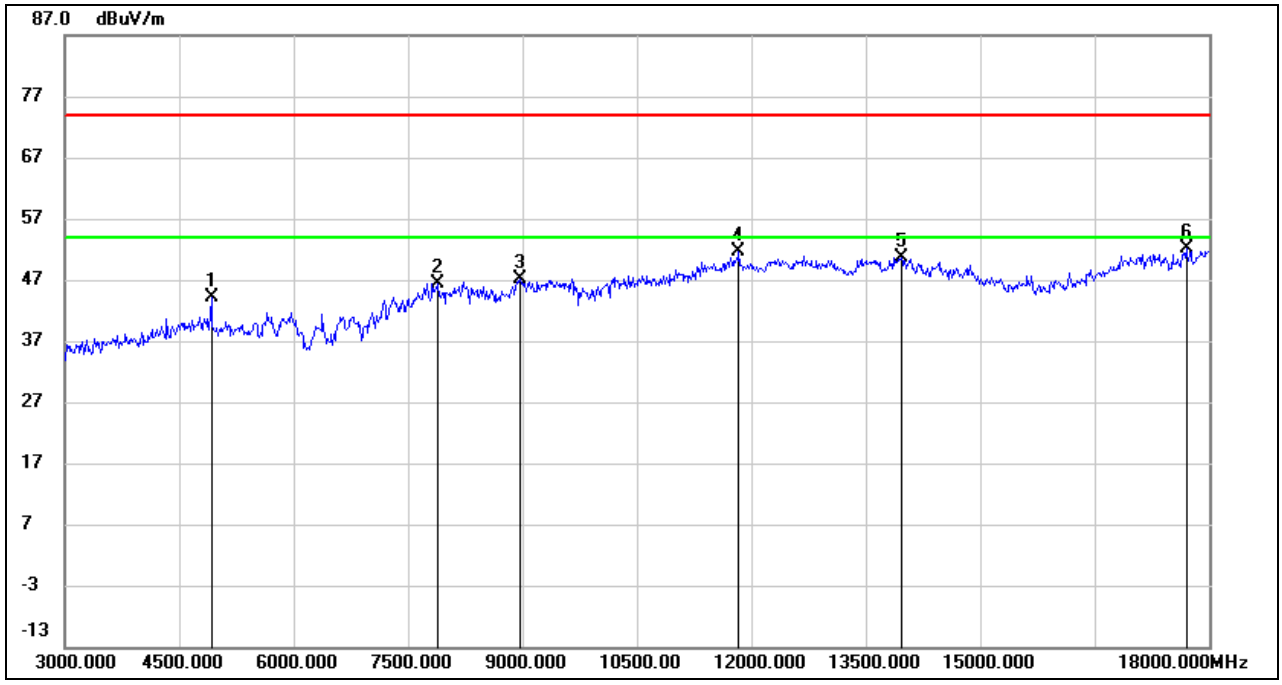
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4875.000	46.00	-0.59	45.41	74.00	-28.59	peak
2	7762.500	39.26	7.46	46.72	74.00	-27.28	peak
3	8962.500	37.86	9.71	47.57	74.00	-26.43	peak
4	11775.000	34.33	17.22	51.55	74.00	-22.45	peak
5	13372.500	33.61	18.09	51.70	74.00	-22.30	peak
6	17347.500	31.46	19.81	51.27	74.00	-22.73	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

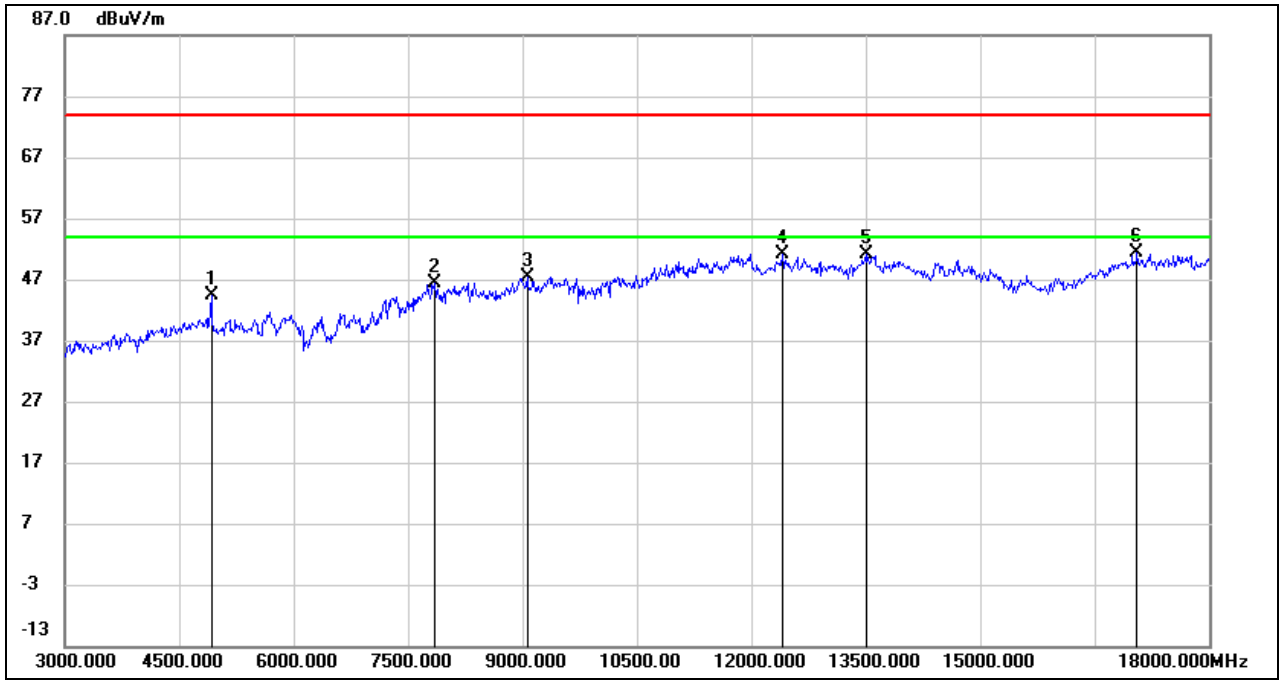
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	44.72	-0.56	44.16	74.00	-29.84	peak
2	7890.000	39.05	7.36	46.41	74.00	-27.59	peak
3	8970.000	37.22	9.80	47.02	74.00	-26.98	peak
4	11835.000	34.23	17.29	51.52	74.00	-22.48	peak
5	13972.500	32.14	18.58	50.72	74.00	-23.28	peak
6	17700.000	30.35	21.80	52.15	74.00	-21.85	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

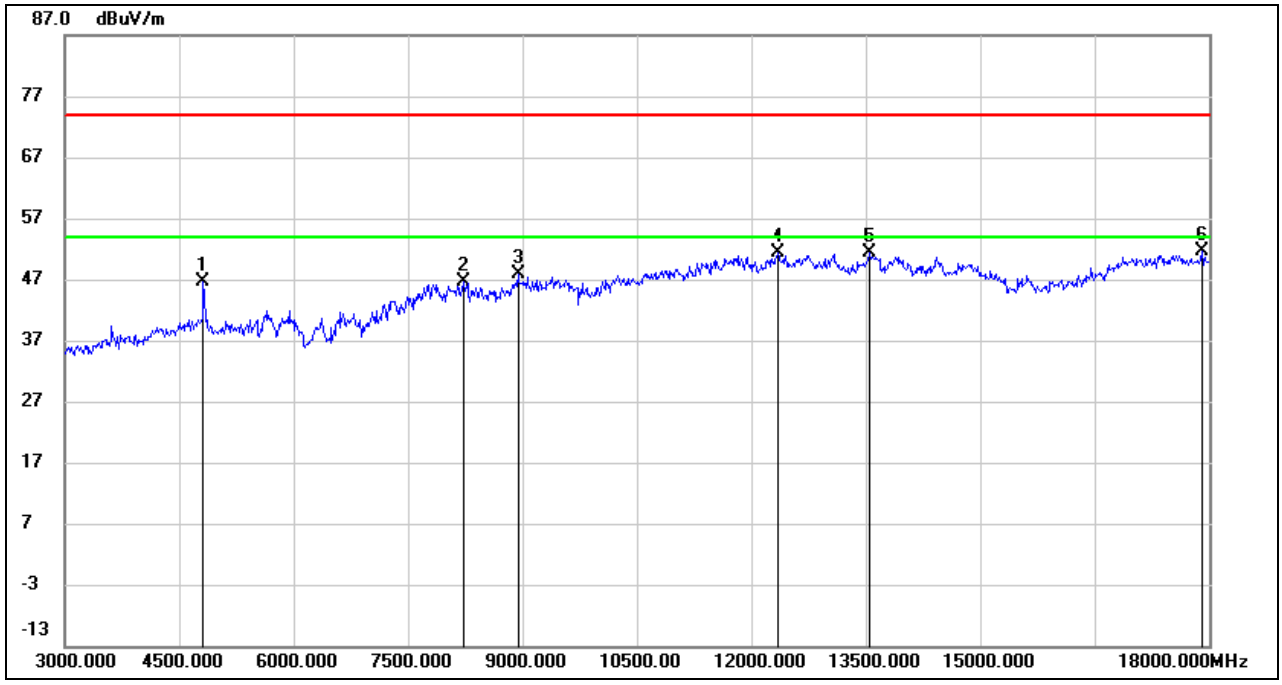


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	44.87	-0.56	44.31	74.00	-29.69	peak
2	7845.000	38.87	7.49	46.36	74.00	-27.64	peak
3	9060.000	37.66	9.78	47.44	74.00	-26.56	peak
4	12412.500	34.26	16.87	51.13	74.00	-22.87	peak
5	13507.500	32.68	18.41	51.09	74.00	-22.91	peak
6	17062.500	32.40	18.90	51.30	74.00	-22.70	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

7.3.3. 802.11n HT20 MIMO MODE

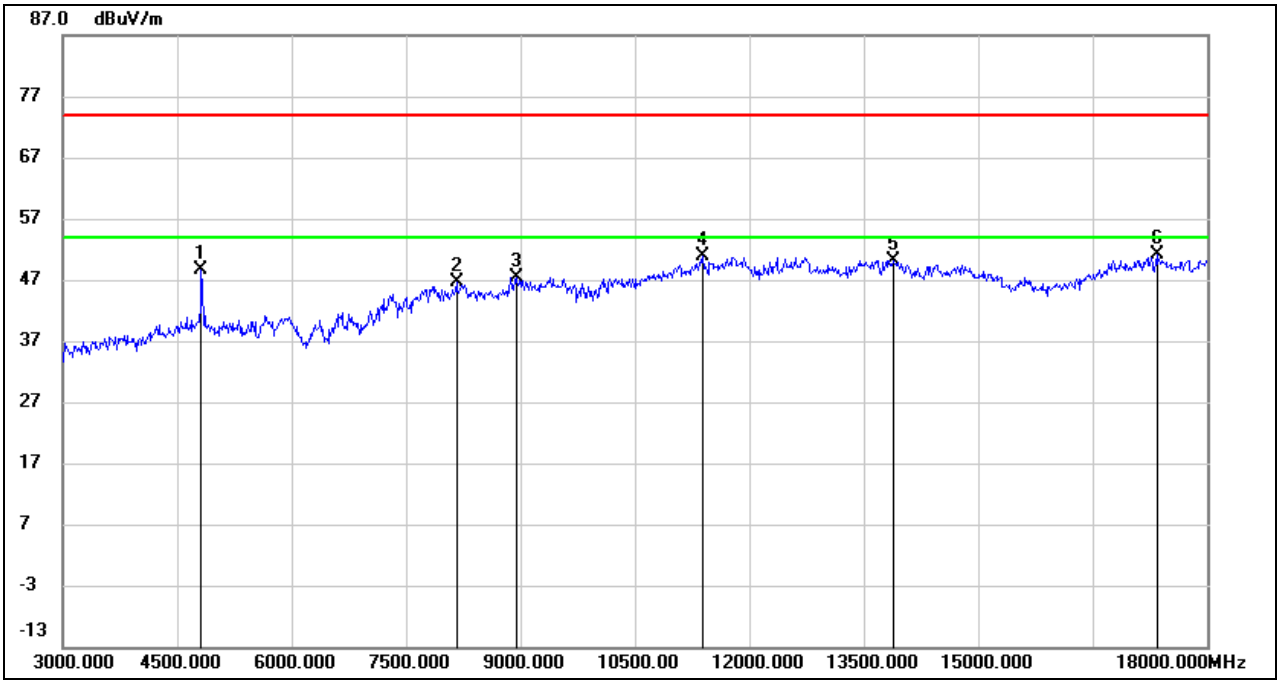
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4822.500	47.22	-0.64	46.58	74.00	-27.42	peak
2	8242.500	38.03	8.54	46.57	74.00	-27.43	peak
3	8947.500	38.23	9.56	47.79	74.00	-26.21	peak
4	12352.500	34.64	16.83	51.47	74.00	-22.53	peak
5	13552.500	32.90	18.39	51.29	74.00	-22.71	peak
6	17917.500	28.38	23.16	51.54	74.00	-22.46	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

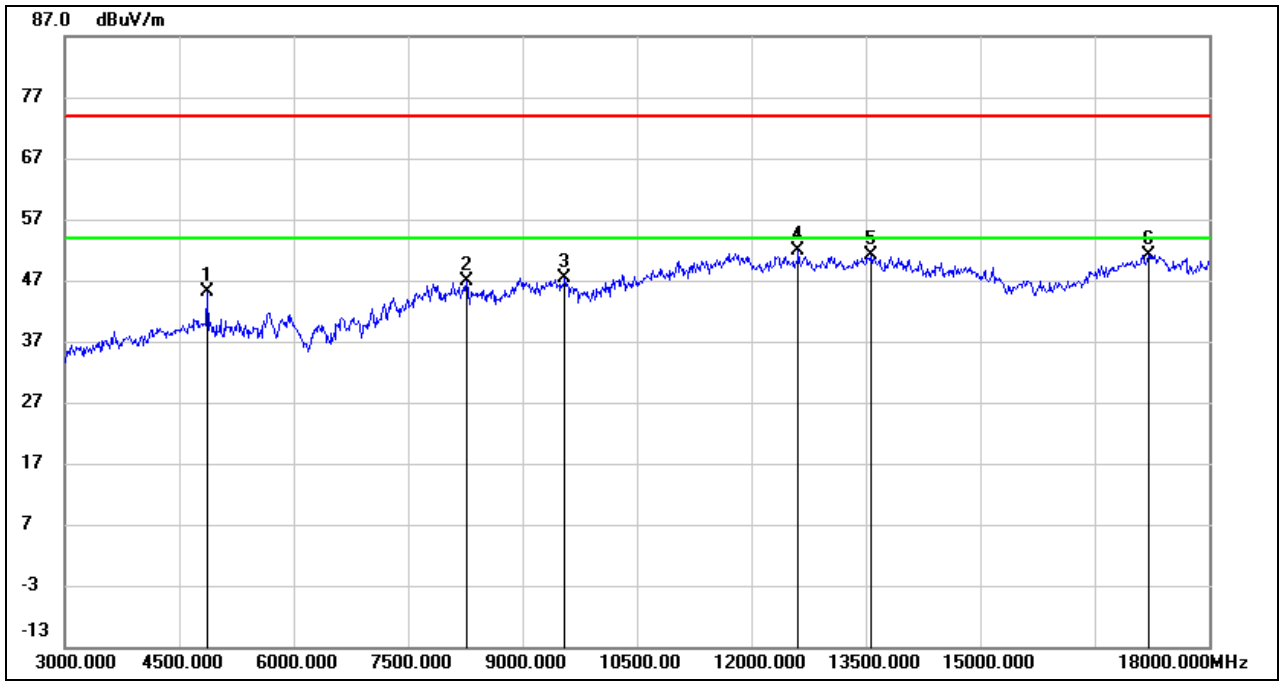
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4815.000	49.38	-0.64	48.74	74.00	-25.26	peak
2	8160.000	38.15	8.39	46.54	74.00	-27.46	peak
3	8947.500	37.79	9.56	47.35	74.00	-26.65	peak
4	11392.500	35.13	15.80	50.93	74.00	-23.07	peak
5	13890.000	31.57	18.67	50.24	74.00	-23.76	peak
6	17347.500	31.40	19.81	51.21	74.00	-22.79	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

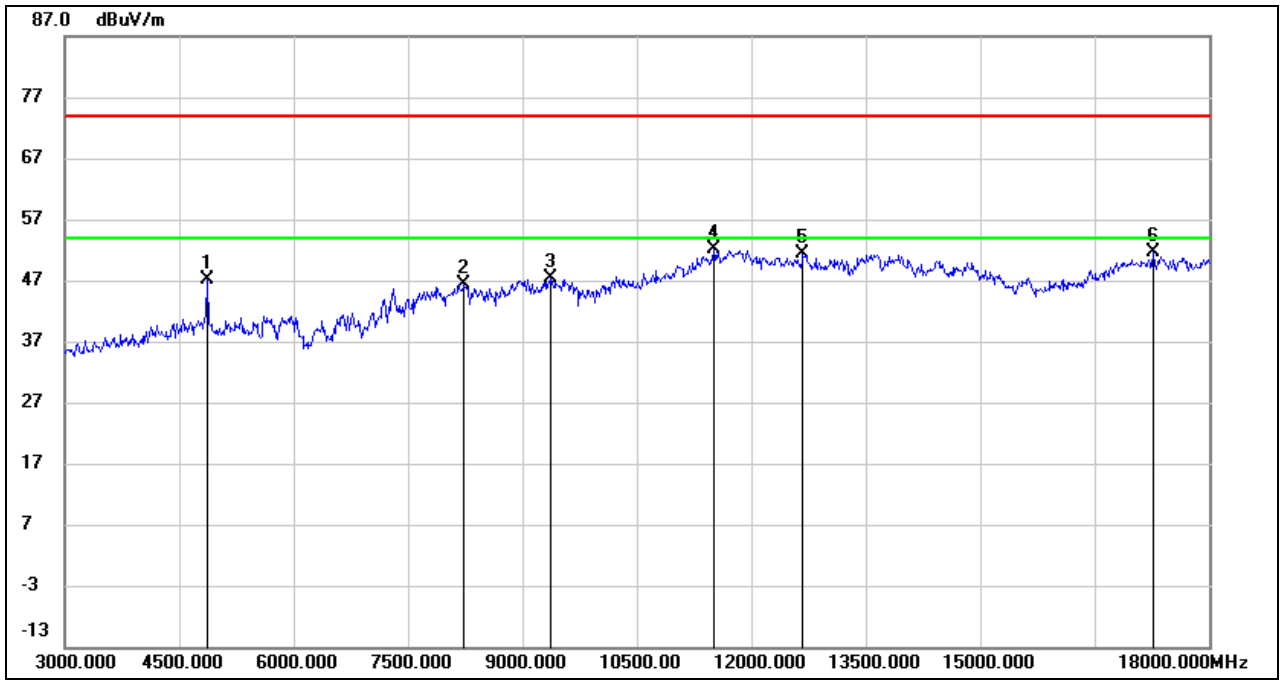
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4867.500	45.84	-0.61	45.23	74.00	-28.77	peak
2	8265.000	38.36	8.45	46.81	74.00	-27.19	peak
3	9562.500	36.87	10.44	47.31	74.00	-26.69	peak
4	12615.000	35.24	16.66	51.90	74.00	-22.10	peak
5	13575.000	32.85	18.38	51.23	74.00	-22.77	peak
6	17212.500	31.50	19.75	51.25	74.00	-22.75	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

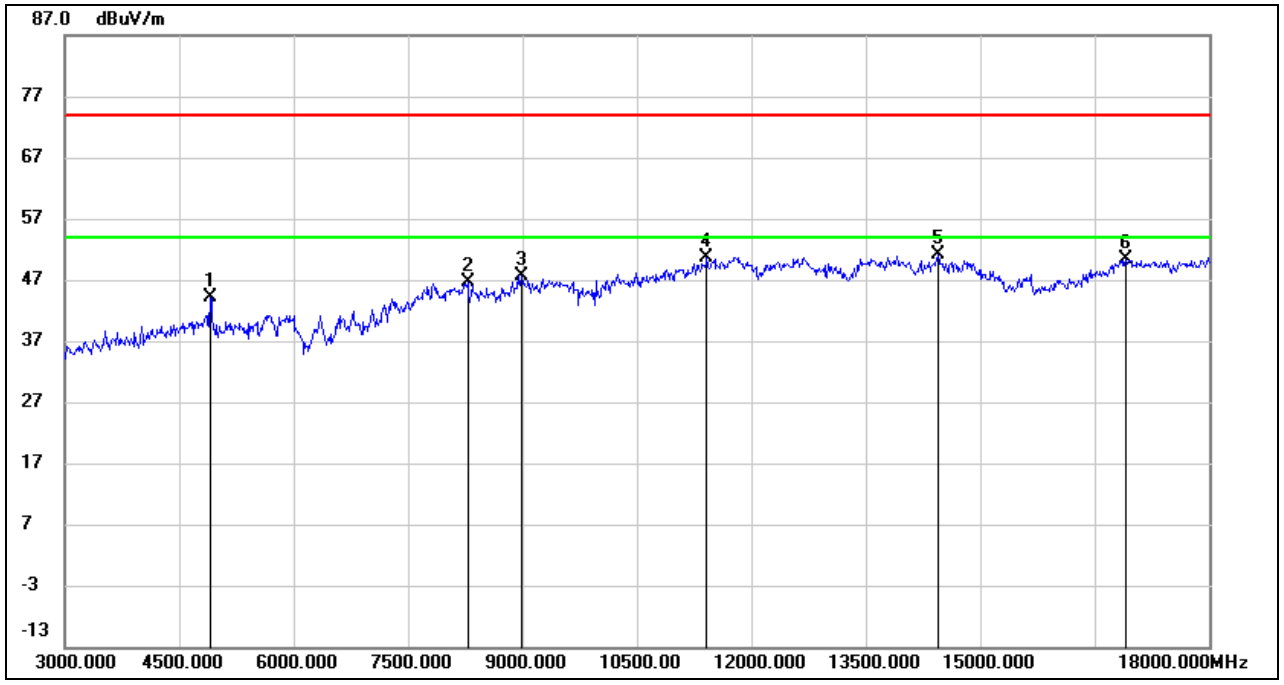
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4875.000	47.69	-0.59	47.10	74.00	-26.90	peak
2	8242.500	37.92	8.54	46.46	74.00	-27.54	peak
3	9375.000	37.34	9.99	47.33	74.00	-26.67	peak
4	11505.000	35.88	16.15	52.03	74.00	-21.97	peak
5	12682.500	34.64	16.81	51.45	74.00	-22.55	peak
6	17265.000	31.76	19.77	51.53	74.00	-22.47	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

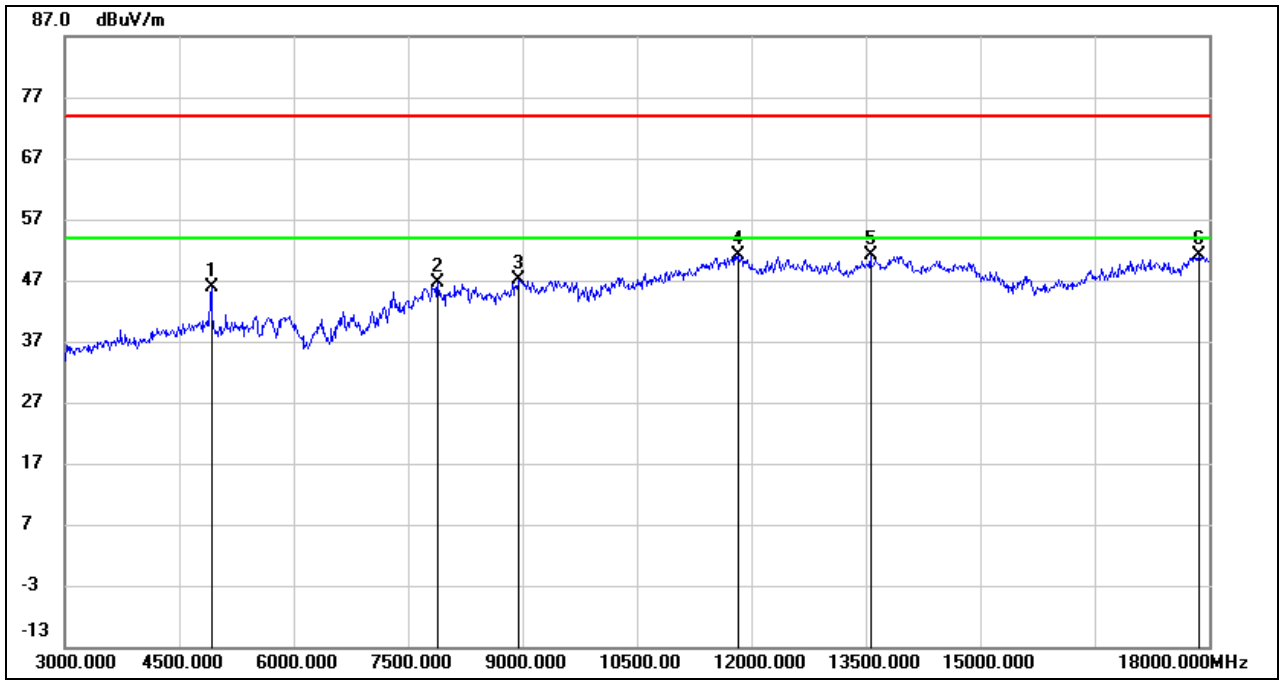
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4912.500	44.74	-0.57	44.17	74.00	-29.83	peak
2	8287.500	38.22	8.36	46.58	74.00	-27.42	peak
3	8992.500	37.64	10.05	47.69	74.00	-26.31	peak
4	11422.500	34.83	15.91	50.74	74.00	-23.26	peak
5	14445.000	33.95	17.23	51.18	74.00	-22.82	peak
6	16905.000	32.10	18.17	50.27	74.00	-23.73	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



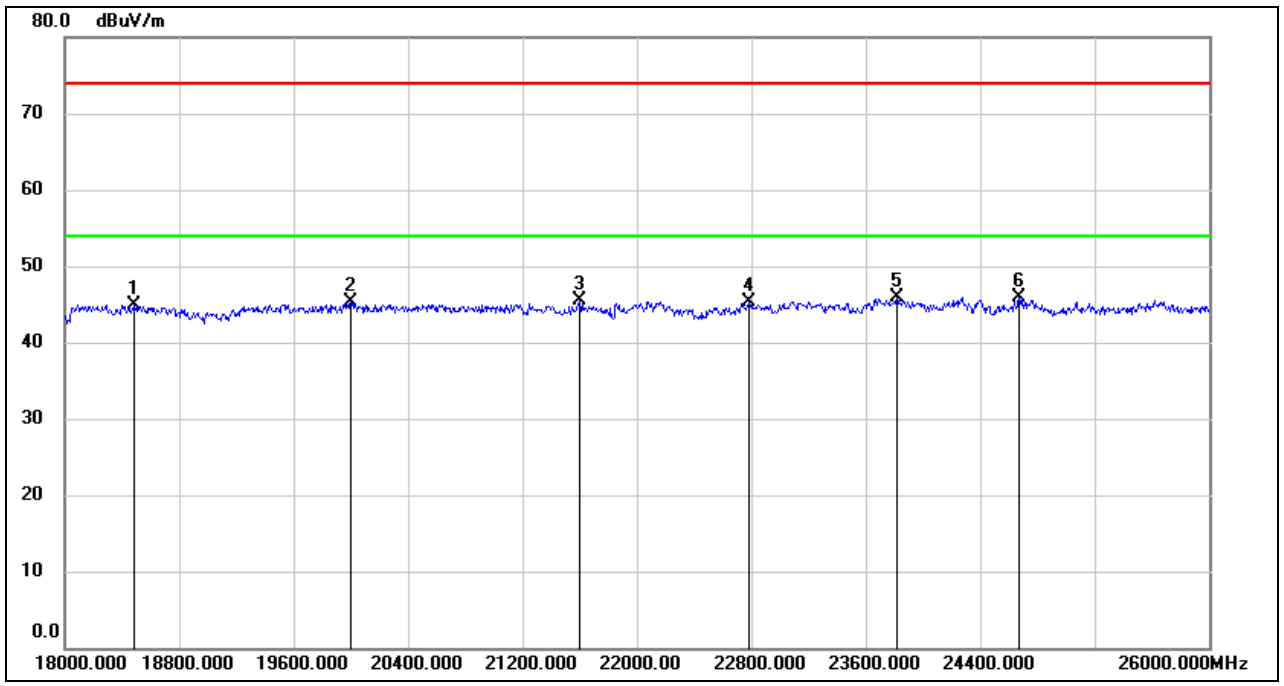
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4927.500	46.45	-0.56	45.89	74.00	-28.11	peak
2	7890.000	39.37	7.36	46.73	74.00	-27.27	peak
3	8962.500	37.30	9.71	47.01	74.00	-26.99	peak
4	11827.500	33.93	17.30	51.23	74.00	-22.77	peak
5	13567.500	32.70	18.38	51.08	74.00	-22.92	peak
6	17872.500	28.01	23.04	51.05	74.00	-22.95	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

7.4. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz)

7.4.1. 802.11n HT20 MIMO MODE

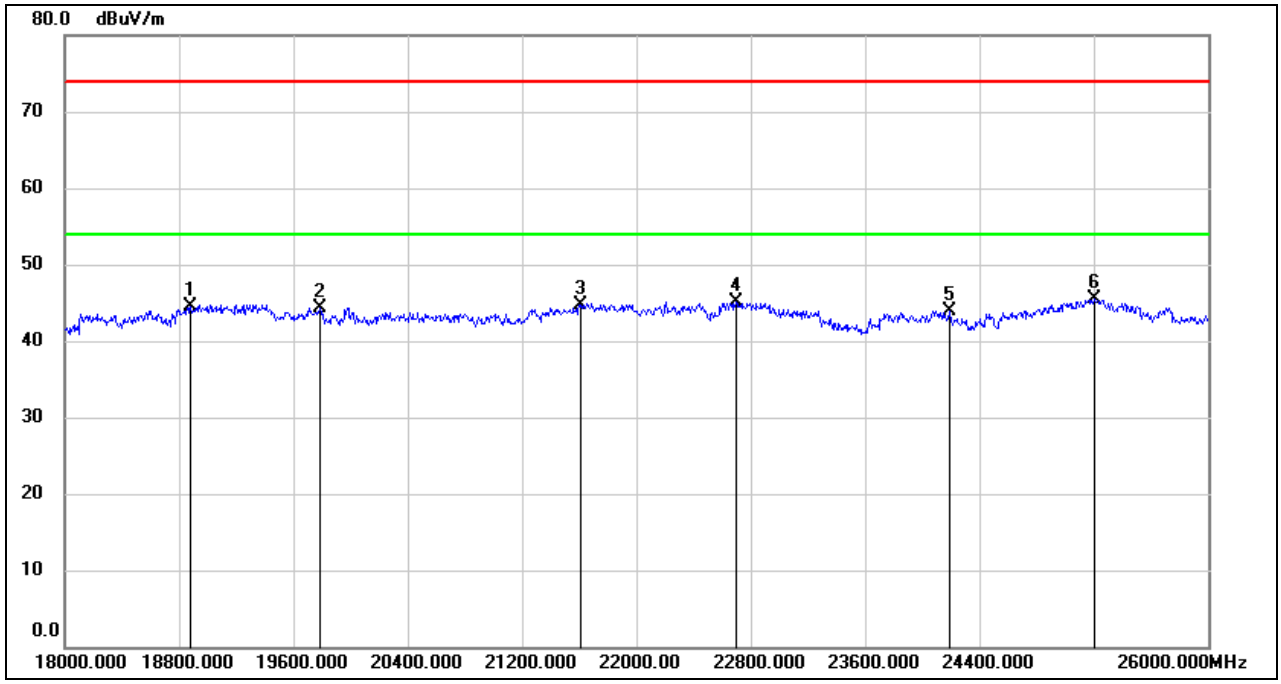
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18488.000	50.15	-5.26	44.89	74.00	-29.11	peak
2	20000.000	50.81	-5.45	45.36	74.00	-28.64	peak
3	21600.000	50.02	-4.54	45.48	74.00	-28.52	peak
4	22784.000	48.98	-3.65	45.33	74.00	-28.67	peak
5	23816.000	48.89	-3.08	45.81	74.00	-28.19	peak
6	24672.000	48.22	-2.33	45.89	74.00	-28.11	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18880.000	49.88	-5.32	44.56	74.00	-29.44	peak
2	19784.000	49.57	-5.28	44.29	74.00	-29.71	peak
3	21608.000	49.27	-4.53	44.74	74.00	-29.26	peak
4	22696.000	48.80	-3.73	45.07	74.00	-28.93	peak
5	24192.000	46.71	-2.81	43.90	74.00	-30.10	peak
6	25208.000	47.24	-1.74	45.50	74.00	-28.50	peak

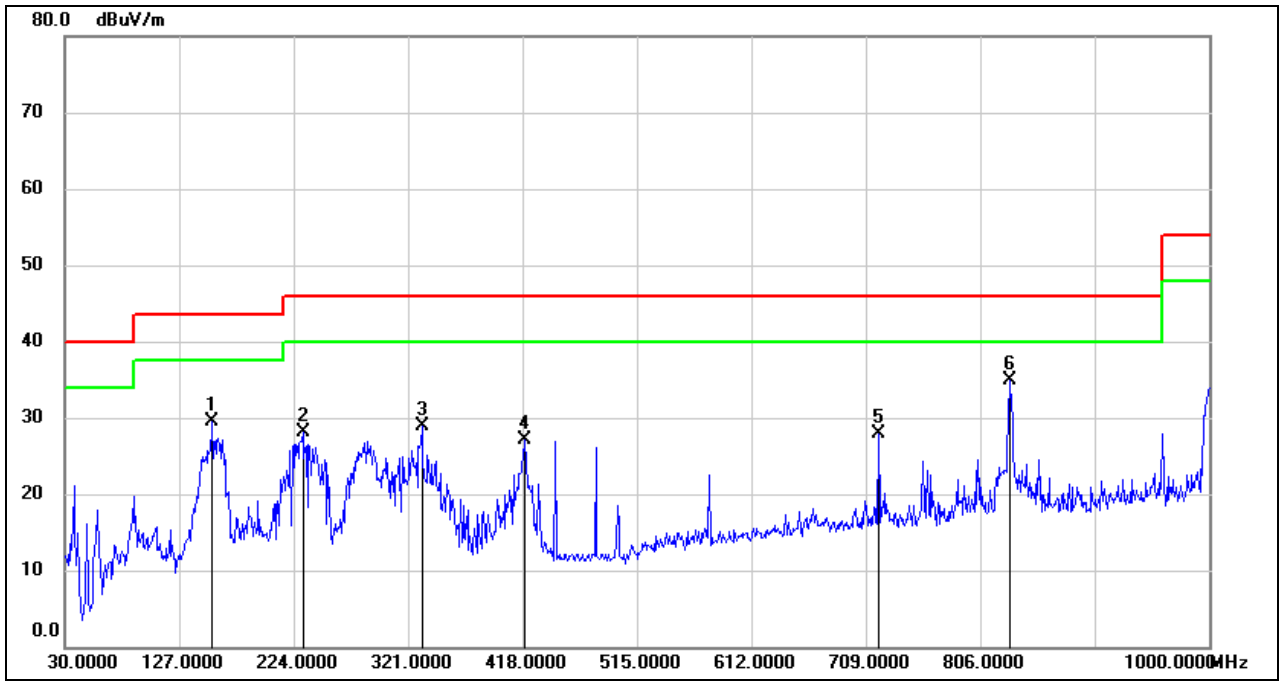
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

Note: All the modes and channels had been tested, but only the worst data was recorded in the report.

7.5. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

7.5.1. 802.11n HT20 MIMO MODE

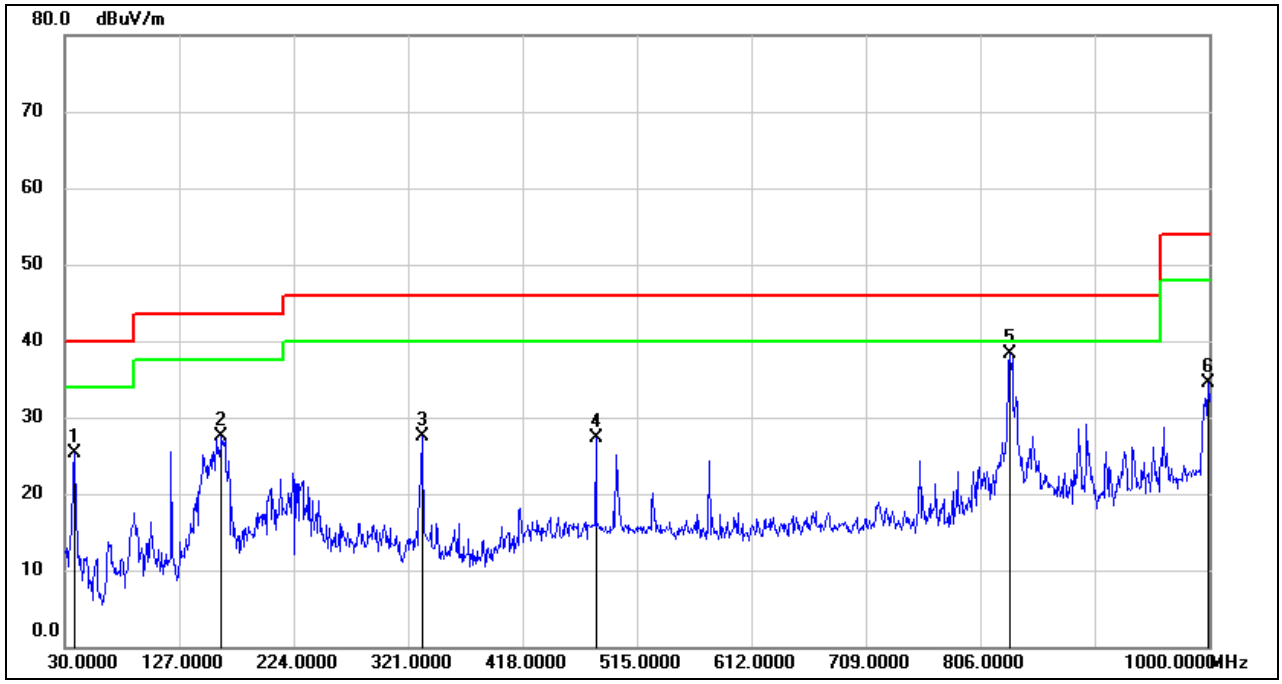
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	155.1300	47.44	-18.01	29.43	43.50	-14.07	QP
2	231.7600	46.80	-18.76	28.04	46.00	-17.96	QP
3	332.6400	43.47	-14.62	28.85	46.00	-17.15	QP
4	419.9400	40.14	-12.99	27.15	46.00	-18.85	QP
5	719.6700	36.01	-8.08	27.93	46.00	-18.07	QP
6	831.2199	41.61	-6.65	34.96	46.00	-11.04	QP

Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	37.7599	45.04	-19.67	25.37	40.00	-14.63	QP
2	162.8900	45.05	-17.62	27.43	43.50	-16.07	QP
3	332.6400	42.08	-14.62	27.46	46.00	-18.54	QP
4	480.0800	39.16	-11.79	27.37	46.00	-18.63	QP
5	831.2199	44.90	-6.65	38.25	46.00	-7.75	QP
6	999.0300	38.64	-4.16	34.48	54.00	-19.52	QP

Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

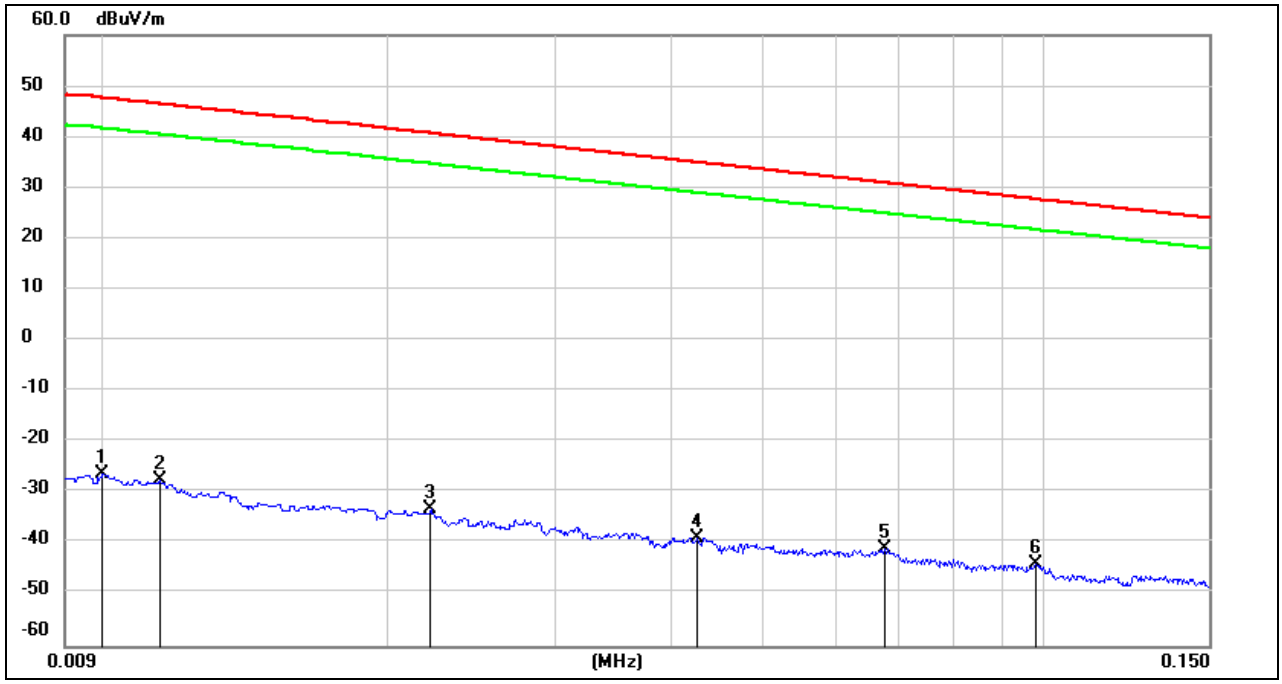
Note: All the modes and channels had been tested, but only the worst data was recorded in the report.

7.6. SPURIOUS EMISSIONS BELOW 30 MHz

7.6.1. 802.11n HT20 MIMO MODE

SPURIOUS EMISSIONS (MID CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)

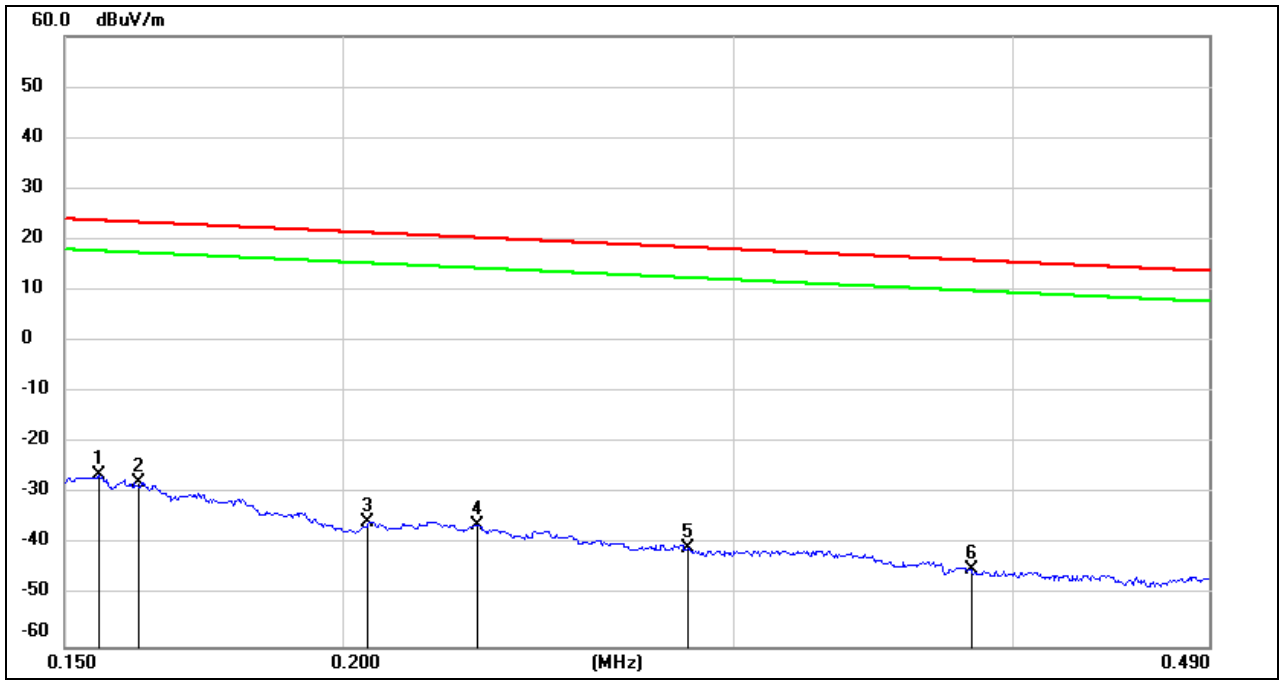
9 kHz~ 150 kHz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0100	75.22	-101.40	-26.18	47.60	-73.78	peak
2	0.0114	73.88	-101.40	-27.52	46.46	-73.98	peak
3	0.0221	68.13	-101.35	-33.22	40.71	-73.93	peak
4	0.0427	62.64	-101.45	-38.81	34.99	-73.80	peak
5	0.0675	60.64	-101.56	-40.92	31.02	-71.94	peak
6	0.0981	57.77	-101.78	-44.01	27.77	-71.78	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

150 kHz ~ 490 kHz



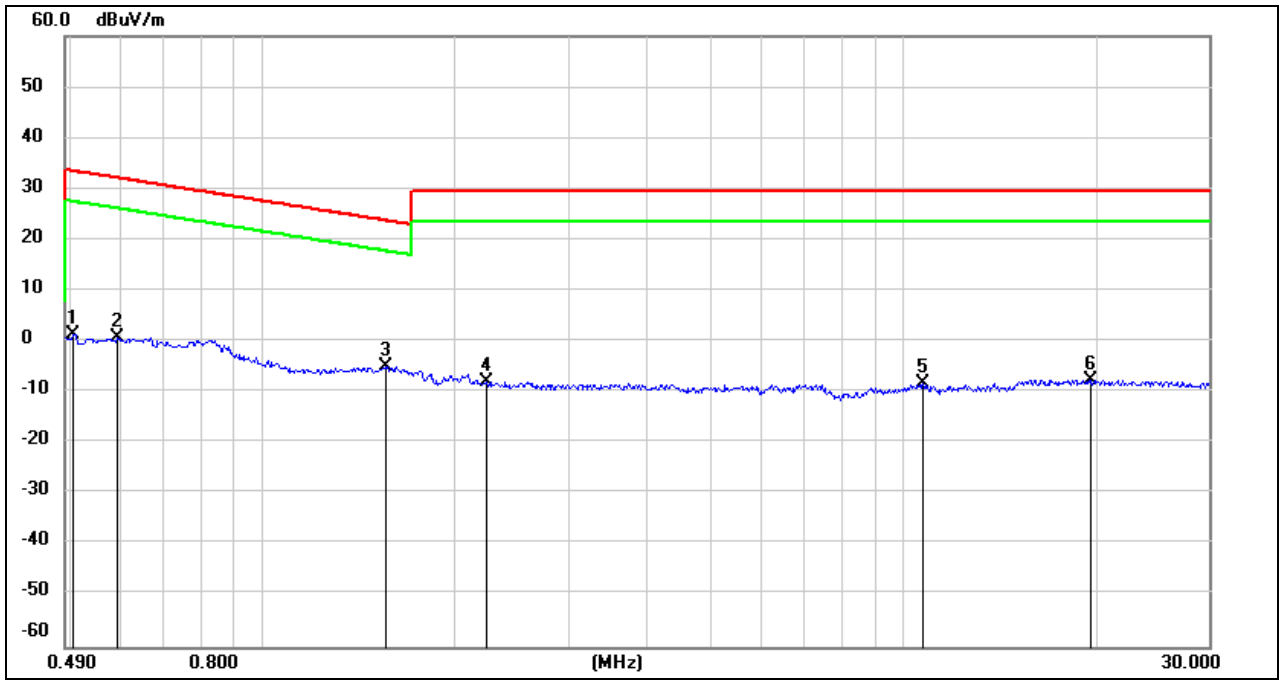
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1554	75.27	-101.65	-26.38	23.77	-50.15	peak
2	0.1621	73.92	-101.65	-27.73	23.41	-51.14	peak
3	0.2053	66.29	-101.73	-35.44	21.35	-56.79	peak
4	0.2298	65.55	-101.77	-36.22	20.37	-56.59	peak
5	0.2857	61.06	-101.83	-40.77	18.48	-59.25	peak
6	0.3830	57.20	-101.94	-44.74	15.94	-60.68	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

490 kHz ~ 30 MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.5039	63.43	-62.07	1.36	33.56	-32.20	peak
2	0.5917	62.74	-62.08	0.66	32.16	-31.50	peak
3	1.5564	57.18	-62.02	-4.84	23.76	-28.60	peak
4	2.2364	53.80	-61.76	-7.96	29.54	-37.50	peak
5	10.7299	52.48	-60.83	-8.35	29.54	-37.89	peak
6	19.7010	53.24	-60.84	-7.60	29.54	-37.14	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All the modes and channels had been tested, but only the worst data was recorded in the report.

8. AC POWER LINE CONDUCTED EMISSIONS

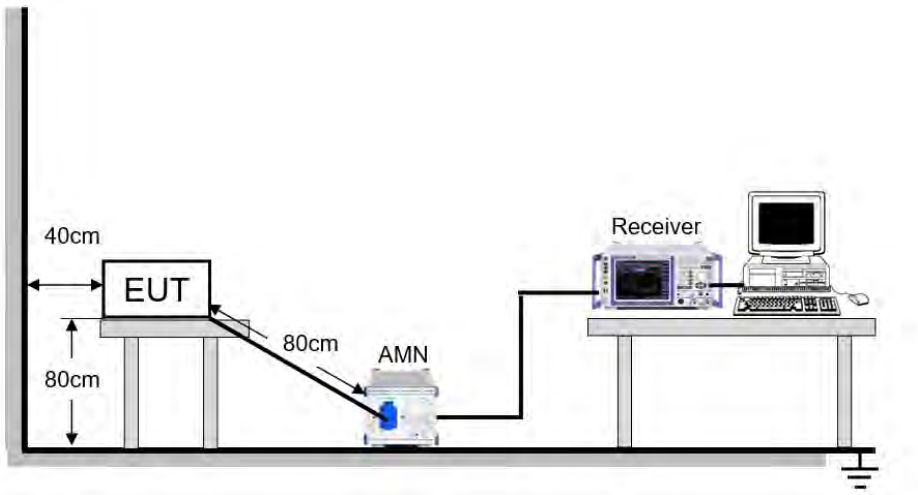
LIMITS

Please refer to CFR 47 FCC §15.207 (a)

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST SETUP AND PROCEDURE

Refer to ANSI C63.10-2013 clause 6.2.



The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

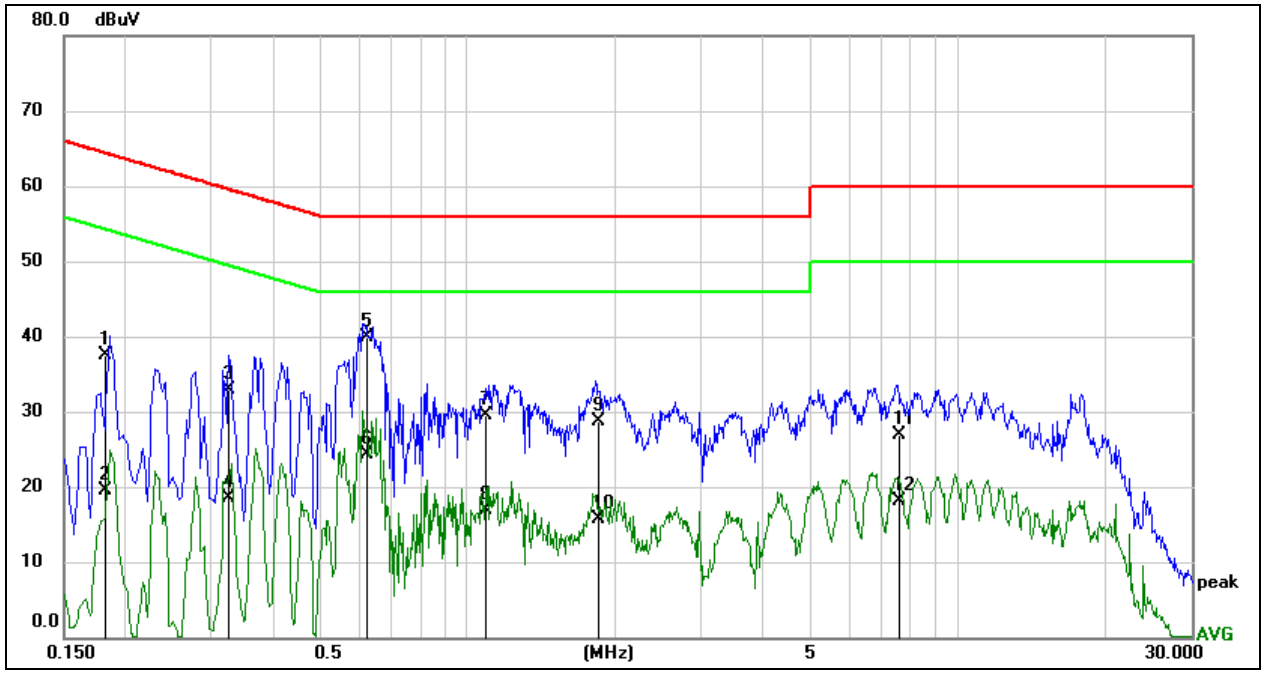
TEST ENVIRONMENT

Temperature	23.3 °C	Relative Humidity	63.2 %
Atmosphere Pressure	101 kPa	Test Voltage	AC 120V_60Hz

RESULTS

8.1. 802.11n HT20 MIMO MODE

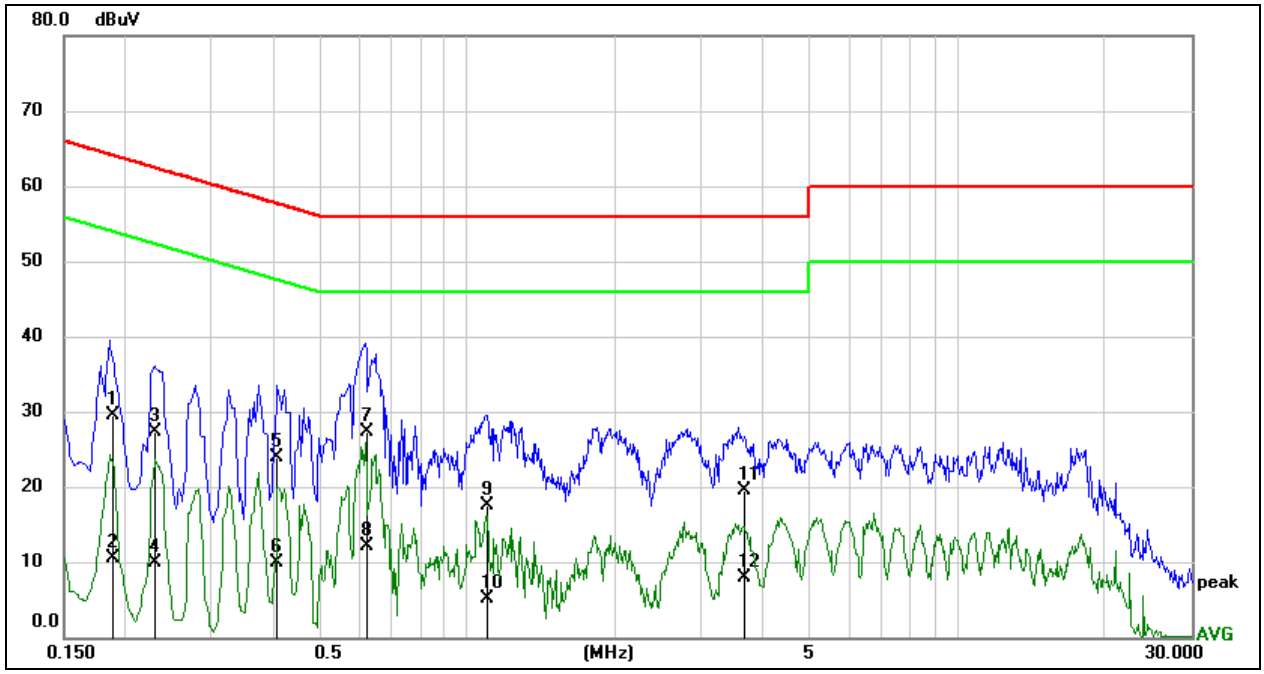
LINE L RESULTS (MID CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1822	37.83	-0.40	37.43	64.38	-26.95	QP
2	0.1822	19.95	-0.40	19.55	54.38	-34.83	AVG
3	0.3261	33.36	-0.40	32.96	59.55	-26.59	QP
4	0.3261	18.96	-0.40	18.56	49.55	-30.99	AVG
5	0.6196	40.25	-0.40	39.85	56.00	-16.15	QP
6	0.6196	24.79	-0.40	24.39	46.00	-21.61	AVG
7	1.0897	29.61	-0.10	29.51	56.00	-26.49	QP
8	1.0897	16.92	-0.10	16.82	46.00	-29.18	AVG
9	1.8513	28.85	-0.10	28.75	56.00	-27.25	QP
10	1.8513	15.71	-0.10	15.61	46.00	-30.39	AVG
11	7.6006	27.45	-0.56	26.89	60.00	-33.11	QP
12	7.6006	18.69	-0.56	18.13	50.00	-31.87	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

LINE N RESULTS (MID CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1899	29.95	-0.40	29.55	64.04	-34.49	QP
2	0.1899	10.82	-0.40	10.42	54.04	-43.62	AVG
3	0.2300	27.66	-0.40	27.26	62.45	-35.19	QP
4	0.2300	10.29	-0.40	9.89	52.45	-42.56	AVG
5	0.4093	24.25	-0.40	23.85	57.66	-33.81	QP
6	0.4093	10.29	-0.40	9.89	47.66	-37.77	AVG
7	0.6245	27.67	-0.40	27.27	56.00	-28.73	QP
8	0.6245	12.57	-0.40	12.17	46.00	-33.83	AVG
9	1.1007	17.65	-0.10	17.55	56.00	-38.45	QP
10	1.1007	5.14	-0.10	5.04	46.00	-40.96	AVG
11	3.6573	19.71	-0.17	19.54	56.00	-36.46	QP
12	3.6573	8.10	-0.17	7.93	46.00	-38.07	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes had been tested, but only the worst data was recorded in the report.

9. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies

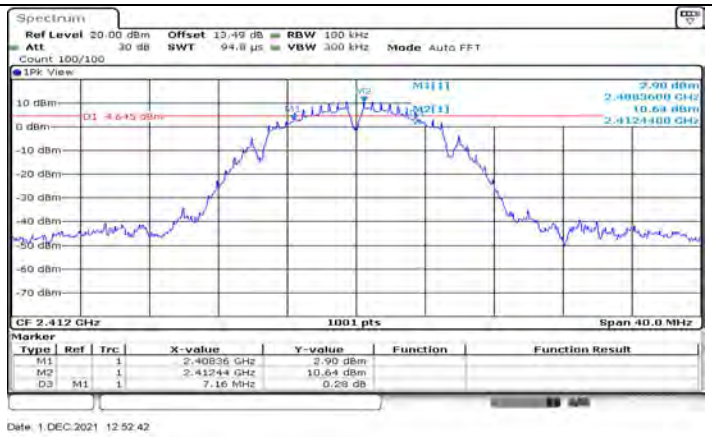
10. Appendix

10.1. Appendix A: DTS Bandwidth

10.1.1. Test Result

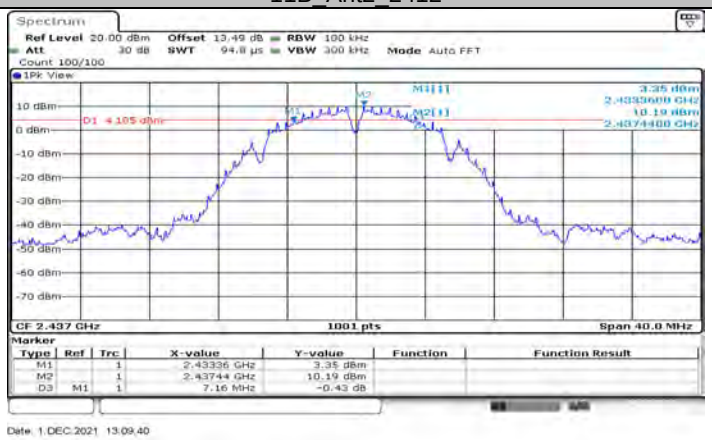
Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	7.160	2408.360	2415.520	0.5	PASS
	Ant2	2412	7.160	2408.360	2415.520	0.5	PASS
	Ant1	2437	7.160	2433.360	2440.520	0.5	PASS
	Ant2	2437	7.160	2433.360	2440.520	0.5	PASS
	Ant1	2462	6.640	2458.840	2465.480	0.5	PASS
	Ant2	2462	7.120	2458.360	2465.480	0.5	PASS
11G	Ant1	2412	16.440	2403.720	2420.160	0.5	PASS
	Ant2	2412	16.440	2403.720	2420.160	0.5	PASS
	Ant1	2437	16.440	2428.720	2445.160	0.5	PASS
	Ant2	2437	16.440	2428.720	2445.160	0.5	PASS
	Ant1	2462	16.440	2453.720	2470.160	0.5	PASS
	Ant2	2462	16.400	2453.720	2470.120	0.5	PASS
11N20MIMO	Ant1	2412	17.600	2403.160	2420.760	0.5	PASS
	Ant2	2412	17.680	2403.080	2420.760	0.5	PASS
	Ant1	2437	17.640	2428.120	2445.760	0.5	PASS
	Ant2	2437	17.680	2428.080	2445.760	0.5	PASS
	Ant1	2462	17.640	2453.120	2470.760	0.5	PASS
	Ant2	2462	17.680	2453.080	2470.760	0.5	PASS

10.1.2. Test Graphs



11B_Ant1_2412

11B_Ant2_2412



11B_Ant1_2437

11B_Ant2_2437

11B_Ant1_2462

11B_Ant2_2462

11G_Ant1_2412

11G_Ant2_2412

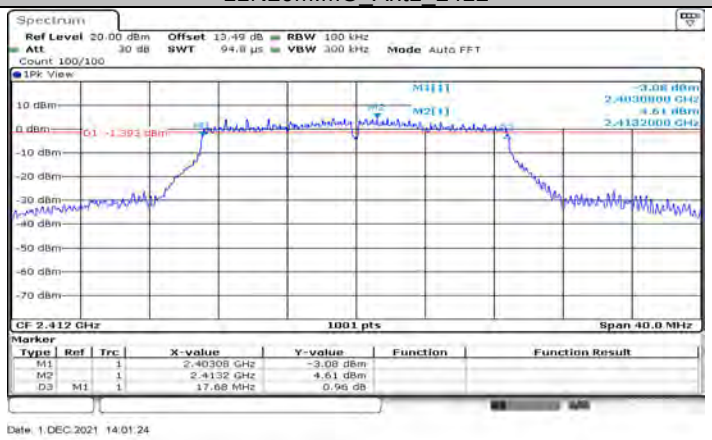
11G_Ant1_2437

11G_Ant2_2437

11G_Ant1_2462

11G_Ant2_2462

11N20MIMO_Ant1_2412

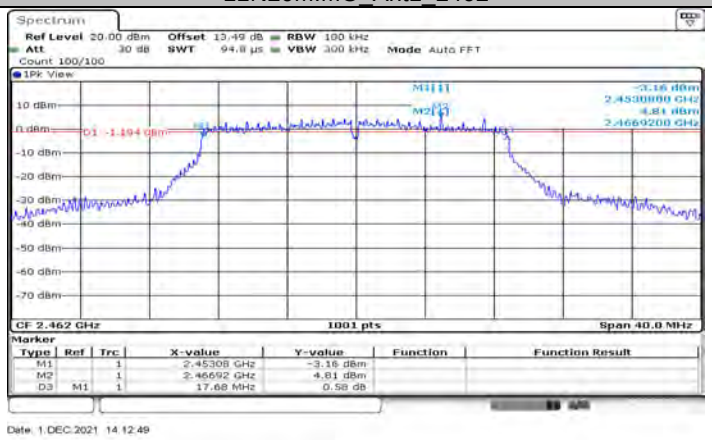


11N20MIMO_Ant2_2412

11N20MIMO_Ant1_2437

11N20MIMO_Ant2_2437

11N20MIMO_Ant1_2462



11N20MIMO_Ant2_2462

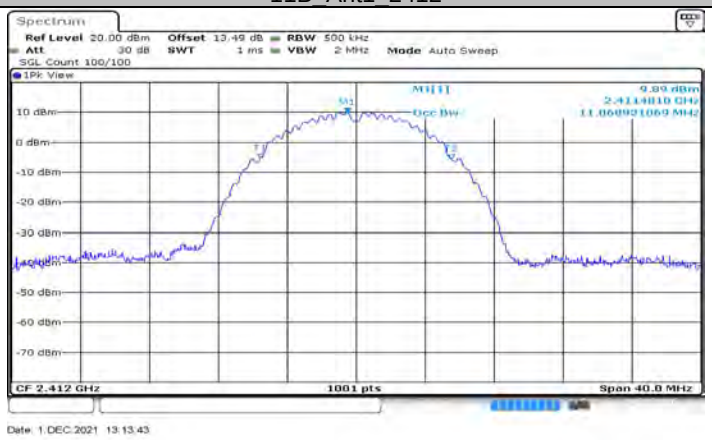
10.2. Appendix B: Occupied Channel Bandwidth

10.2.1. Test Result

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
11B	Ant1	2412	11.349	2406.406	2417.754	PASS
	Ant2	2412	11.069	2406.446	2417.514	PASS
	Ant1	2437	11.349	2431.366	2442.714	PASS
	Ant2	2437	11.189	2431.406	2442.594	PASS
	Ant1	2462	11.429	2456.326	2467.754	PASS
	Ant2	2462	11.189	2456.366	2467.554	PASS
11G	Ant1	2412	17.463	2403.289	2420.751	PASS
	Ant2	2412	17.622	2403.169	2420.791	PASS
	Ant1	2437	17.463	2428.289	2445.751	PASS
	Ant2	2437	17.502	2428.249	2445.751	PASS
	Ant1	2462	17.502	2453.249	2470.751	PASS
	Ant2	2462	17.582	2453.169	2470.751	PASS
11N20MIMO	Ant1	2412	18.501	2402.809	2421.311	PASS
	Ant2	2412	18.142	2402.889	2421.031	PASS
	Ant1	2437	18.422	2427.769	2446.191	PASS
	Ant2	2437	18.062	2427.929	2445.991	PASS
	Ant1	2462	18.422	2452.809	2471.231	PASS
	Ant2	2462	18.182	2452.849	2471.031	PASS

10.2.2. Test Graphs

11B_Ant1_2412



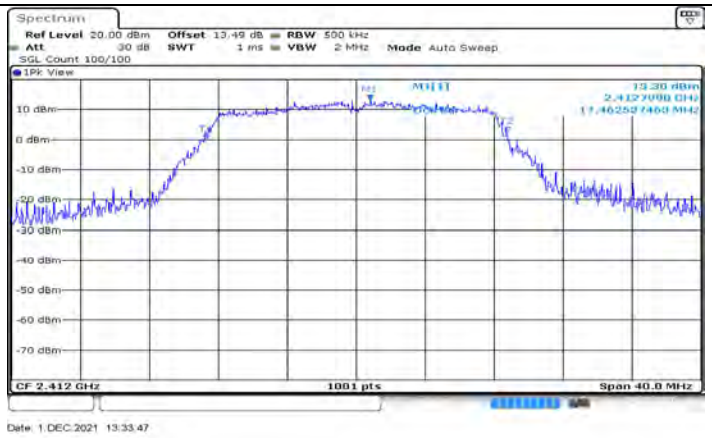
11B_Ant2_2412

11B_Ant1_2437

11B_Ant2_2437

11B_Ant1_2462

11B_Ant2_2462



11G_Ant1_2412

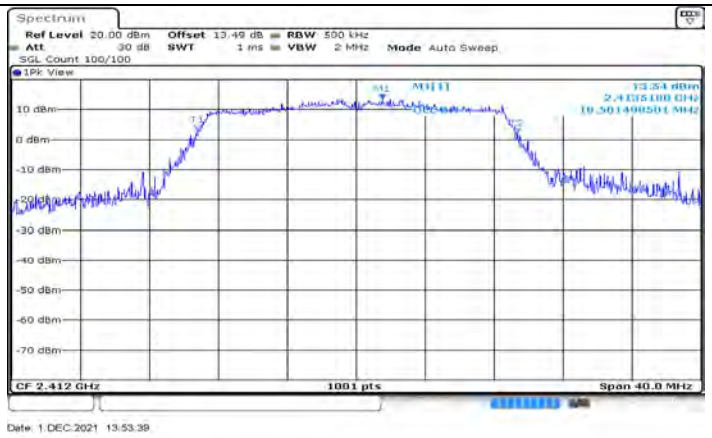
11G_Ant2_2412

11G_Ant1_2437

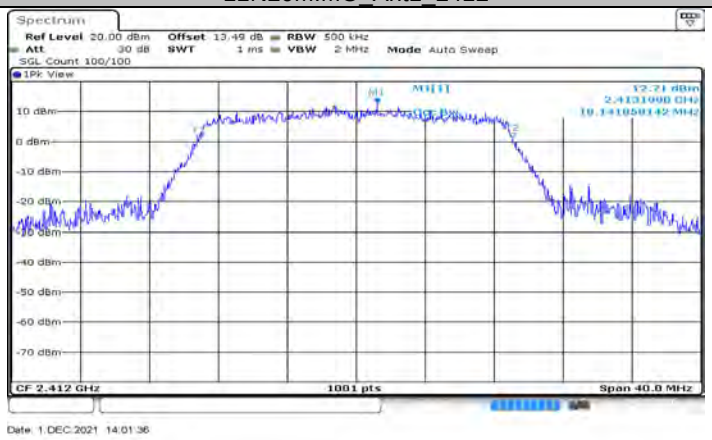
11G_Ant2_2437

11G_Ant1_2462

11G_Ant2_2462

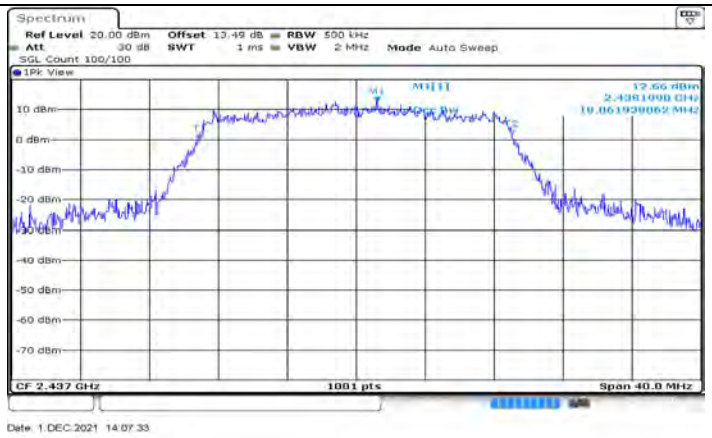


11N20MIMO_Ant1_2412



11N20MIMO_Ant2_2412

11N20MIMO_Ant1_2437



11N20MIMO_Ant2_2437

11N20MIMO_Ant1_2462

11N20MIMO_Ant2_2462

10.3. Appendix C: Maximum conducted output power

10.3.1. Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	13.35	≤30	PASS
	Ant2	2412	12.14	≤30	PASS
	Ant1	2437	13.48	≤30	PASS
	Ant2	2437	12.47	≤30	PASS
	Ant1	2462	13.30	≤30	PASS
	Ant2	2462	12.32	≤30	PASS
11G	Ant1	2412	13.12	≤30	PASS
	Ant2	2412	12.09	≤30	PASS
	Ant1	2437	13.22	≤30	PASS
	Ant2	2437	12.12	≤30	PASS
	Ant1	2462	13.19	≤30	PASS
	Ant2	2462	12.01	≤30	PASS
11N20MIMO	Ant1	2412	13.22	≤30	PASS
	Ant2	2412	12.12	≤30	PASS
	total	2412	15.72	≤30	PASS
	Ant1	2437	13.19	≤30	PASS
	Ant2	2437	12.23	≤30	PASS
	total	2437	15.75	≤30	PASS
	Ant1	2462	13.22	≤30	PASS
	Ant2	2462	12.11	≤30	PASS
	total	2462	15.71	≤30	PASS

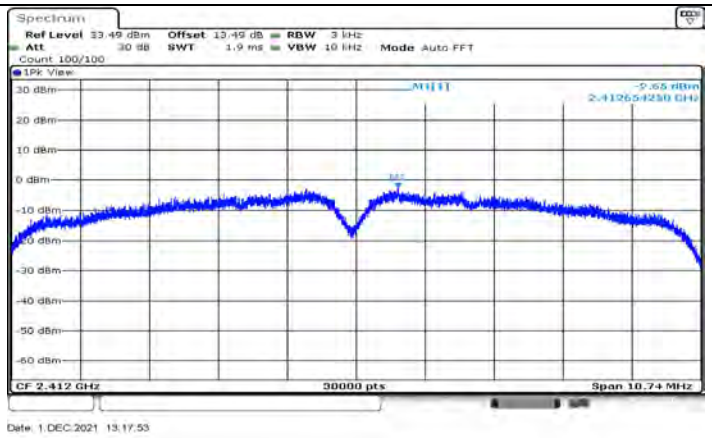
Note: 1. Conducted Power=Meas. Level+ Correction Factor
2. The Duty Cycle Factor (refer to section 7.1) had already compensated to the test data.

10.4. Appendix D: Maximum power spectral density

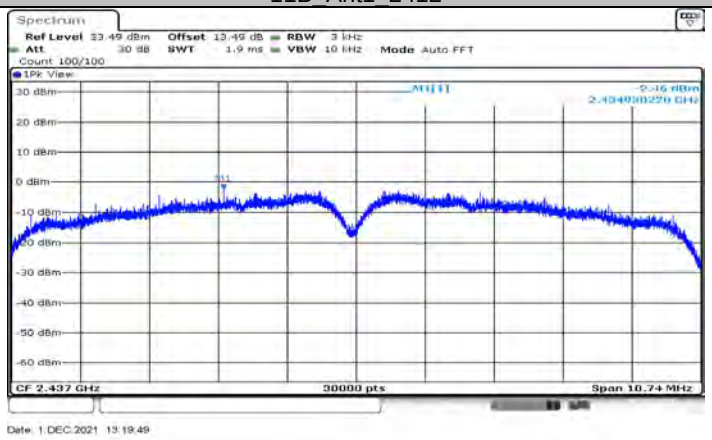
10.4.1. Test Result

Test Mode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-2.65	≤8	PASS
		2437	-2.46	≤8	PASS
		2462	-2.5	≤8	PASS
11G	Ant1	2412	-4.68	≤8	PASS
		2437	-4.62	≤8	PASS
		2462	-5.51	≤8	PASS
11N20MIMO	Ant1	2412	-5.3	≤8	PASS
	Ant2	2412	-6.03	≤8	PASS
	total	2412	-2.64	≤8	PASS
	Ant1	2437	-5.75	≤8	PASS
	Ant2	2437	-7.35	≤8	PASS
	total	2437	-3.47	≤8	PASS
	Ant1	2462	-5.91	≤8	PASS
	Ant2	2462	-6.38	≤8	PASS
	total	2462	-3.13	≤8	PASS

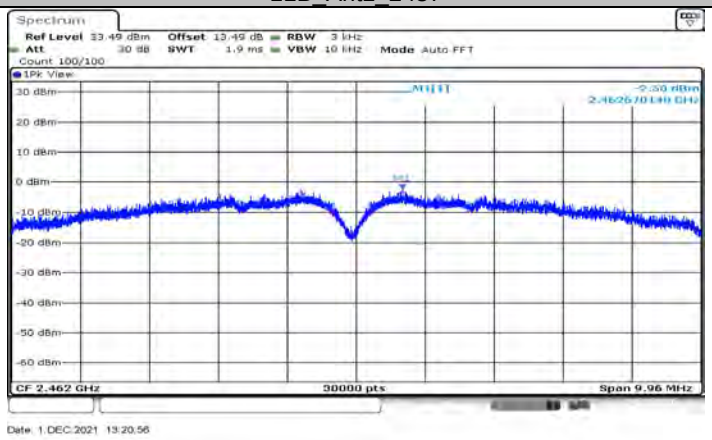
10.4.2. Test Graphs



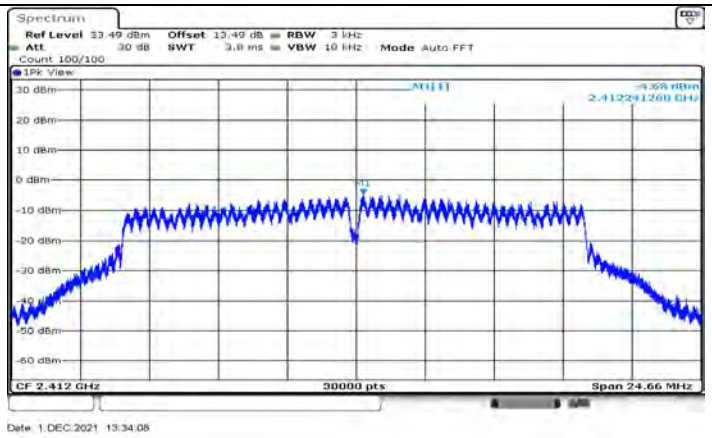
11B_Ant1_2412



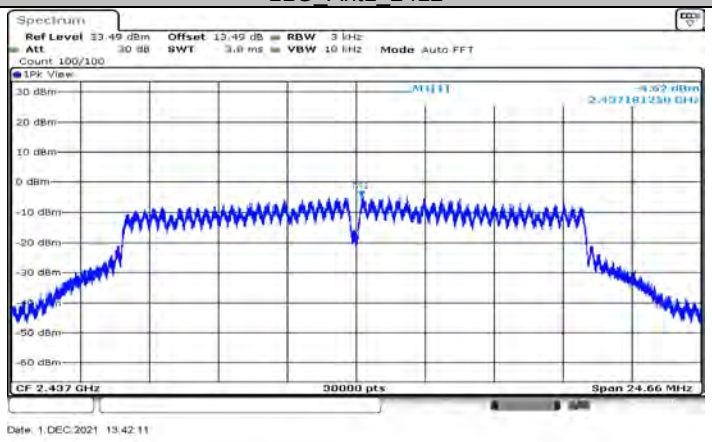
11B_Ant1_2437



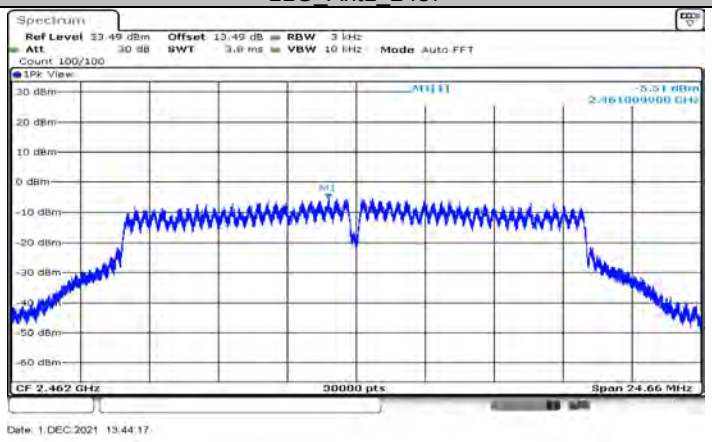
11B_Ant1_2462



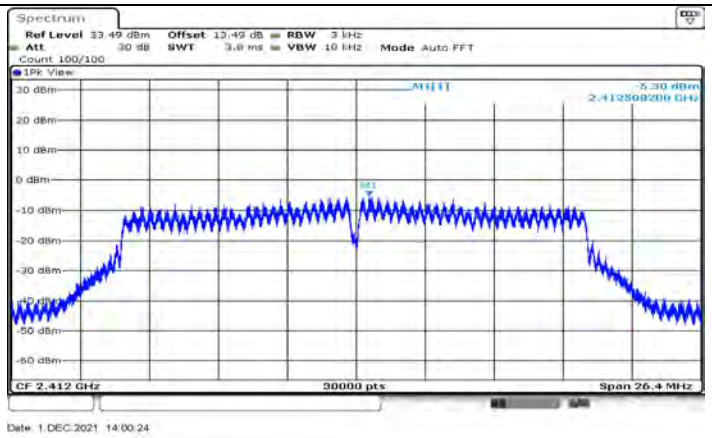
11G_Ant1_2412



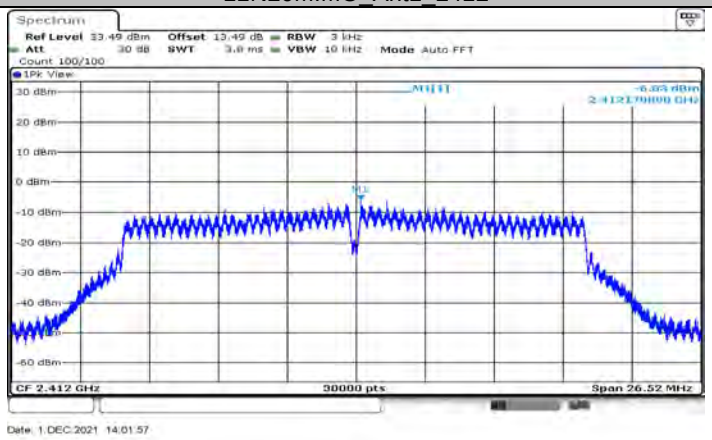
11G_Ant1_2437



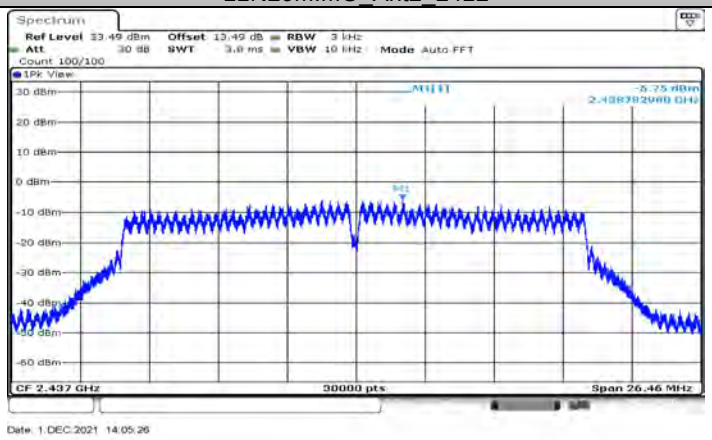
11G_Ant1_2462



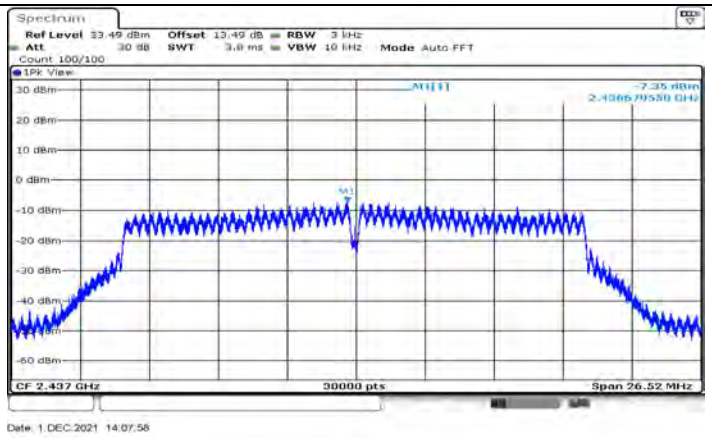
11N20MIMO_Ant1_2412



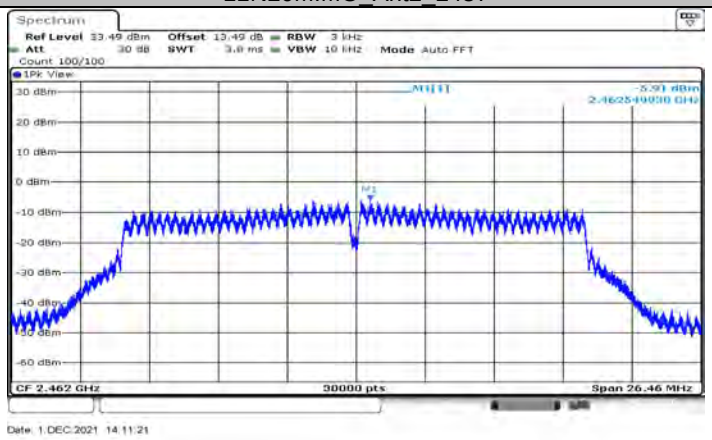
11N20MIMO_Ant2_2412



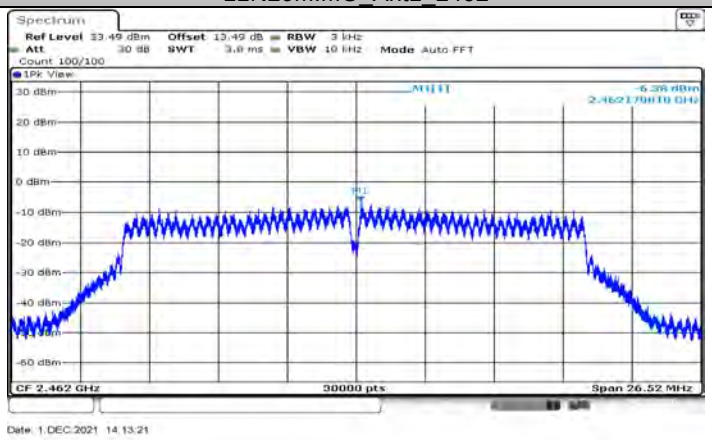
11N20MIMO_Ant1_2437



11N20MIMO_Ant2_2437



11N20MIMO_Ant1_2462



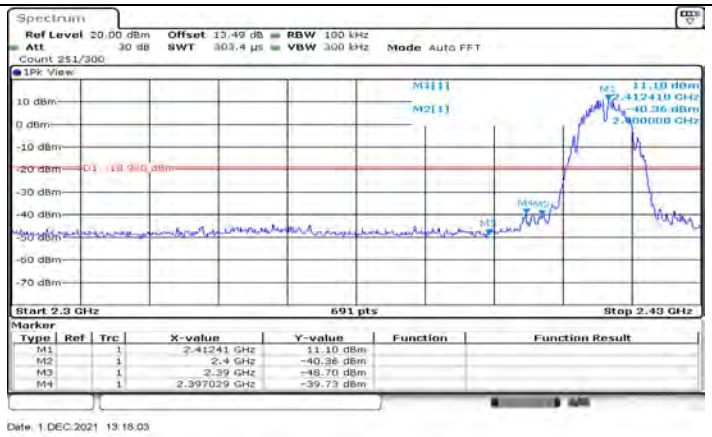
11N20MIMO_Ant2_2462

10.5. Appendix E: Band edge measurements

10.5.1. Test Result

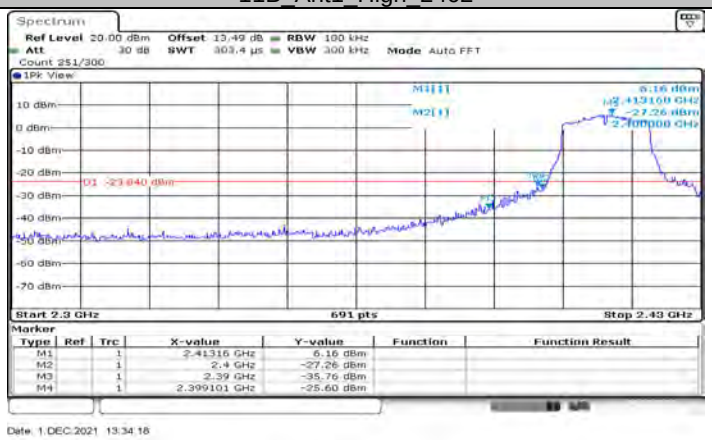
Test Mode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	11.10	-39.73	≤-18.9	PASS
		High	2462	10.72	-44.59	≤-19.28	PASS
11G	Ant1	Low	2412	6.16	-25.6	≤-23.84	PASS
		High	2462	6.86	-34.52	≤-23.14	PASS
11N20MIMO	Ant1	Low	2412	5.19	-25.92	≤-24.81	PASS
	Ant2	Low	2412	4.66	-28.07	≤-25.34	PASS
	Ant1	High	2462	5.61	-34.38	≤-24.39	PASS
	Ant2	High	2462	4.63	-37.58	≤-25.37	PASS

10.5.2. Test Graphs



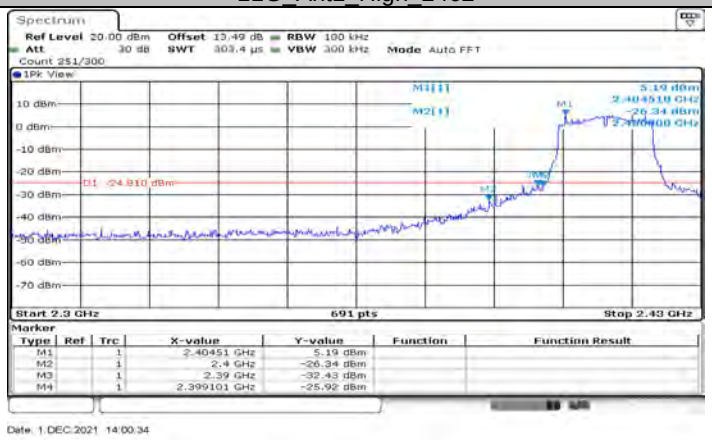
11B_Ant1_Low_2412

11B_Ant1_High_2462

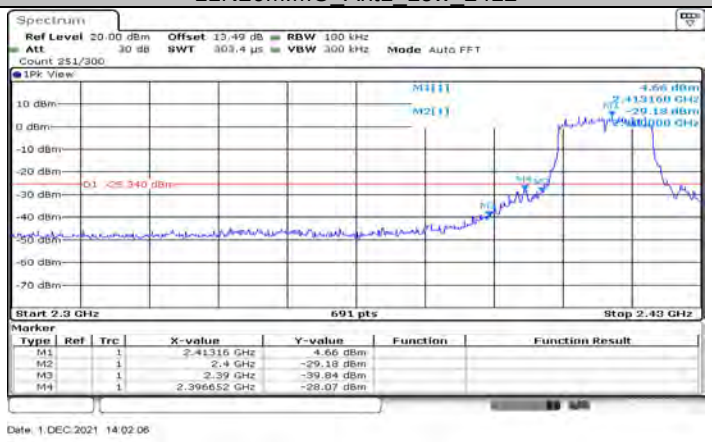


11G_Ant1_Low_2412

11G_Ant1_High_2462



11N20MIMO_Ant1_Low_2412



11N20MIMO_Ant2_Low_2412

11N20MIMO_Ant1_High_2462

11N20MIMO_Ant2_High_2462

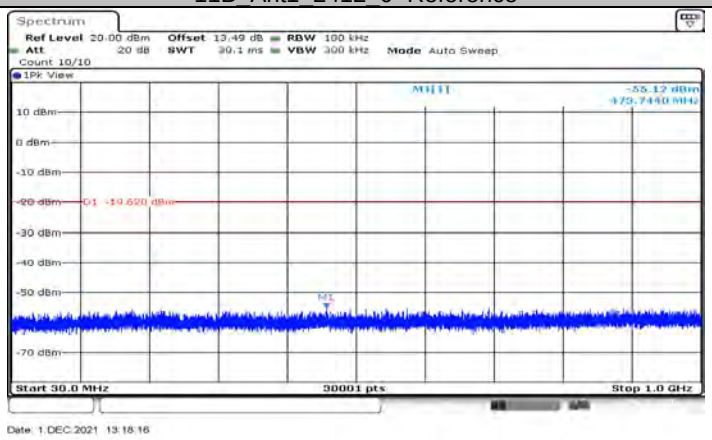
10.6. Appendix F: Conducted Spurious Emission

10.6.1. Test Result

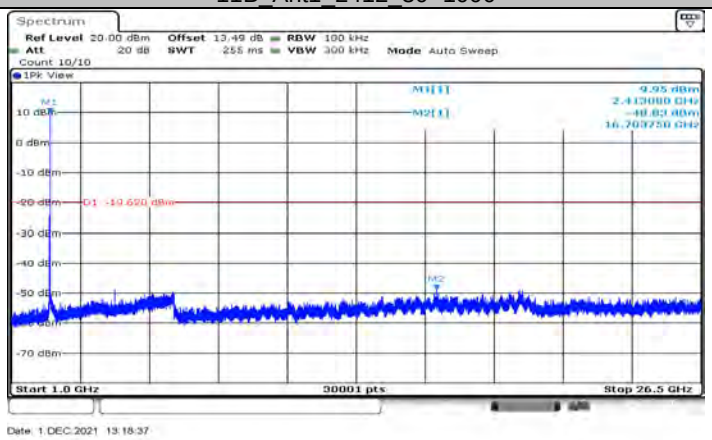
Test Mode	Antenna	Channel	FreqRange [Mhz]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	10.38	---	PASS
			30~1000	-55.12	≤-19.62	PASS
			1000~26500	-48.83	≤-19.62	PASS
		2437	Reference	11.14	---	PASS
			30~1000	-53.83	≤-18.86	PASS
			1000~26500	-49.45	≤-18.86	PASS
		2462	Reference	10.24	---	PASS
			30~1000	-54.27	≤-19.76	PASS
			1000~26500	-48.89	≤-19.76	PASS
11G	Ant1	2412	Reference	6.04	---	PASS
			30~1000	-53.8	≤-23.96	PASS
			1000~26500	-48.24	≤-23.96	PASS
		2437	Reference	6.56	---	PASS
			30~1000	-54.57	≤-23.44	PASS
			1000~26500	-49.69	≤-23.44	PASS
		2462	Reference	6.74	---	PASS
			30~1000	-54.7	≤-23.26	PASS
			1000~26500	-49.12	≤-23.26	PASS
11N20MIMO	Ant1	2412	Reference	7.31	---	PASS
			30~1000	-54.3	≤-22.69	PASS
			1000~26500	-48.52	≤-22.69	PASS
	Ant2	2412	Reference	4.66	---	PASS
			30~1000	-54.12	≤-25.34	PASS
			1000~26500	-49.81	≤-25.34	PASS
	Ant1	2437	Reference	5.72	---	PASS
			30~1000	-54.66	≤-24.28	PASS
			1000~26500	-47.91	≤-24.28	PASS
	Ant2	2437	Reference	4.98	---	PASS
			30~1000	-54.09	≤-25.02	PASS
			1000~26500	-48.62	≤-25.02	PASS
	Ant1	2462	Reference	5.42	---	PASS
			30~1000	-54.87	≤-24.58	PASS
			1000~26500	-48.6	≤-24.58	PASS
	Ant2	2462	Reference	4.28	---	PASS
			30~1000	-53.22	≤-25.72	PASS
			1000~26500	-49.42	≤-25.72	PASS

10.6.2. Test Graphs

11B_Ant1_2412_0~Reference

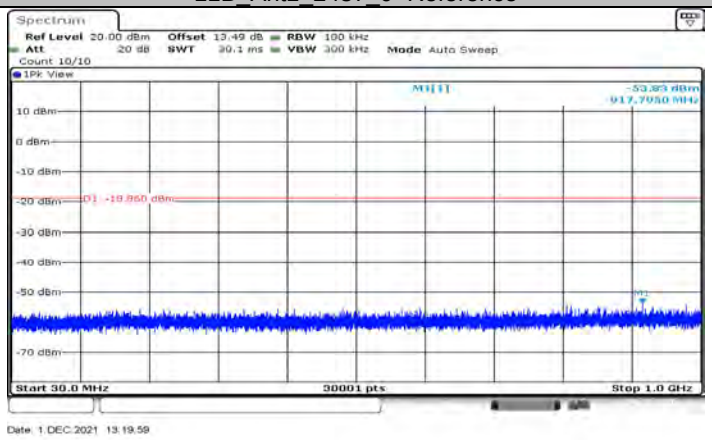


11B_Ant1_2412_30~1000

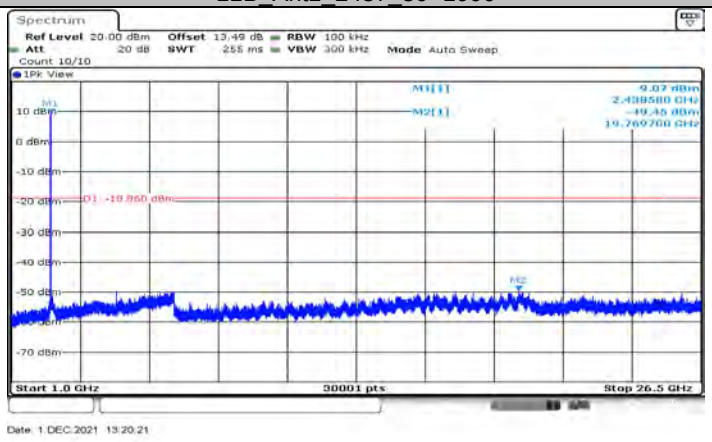


11B_Ant1_2412_1000~26500

11B_Ant1_2437_0~Reference

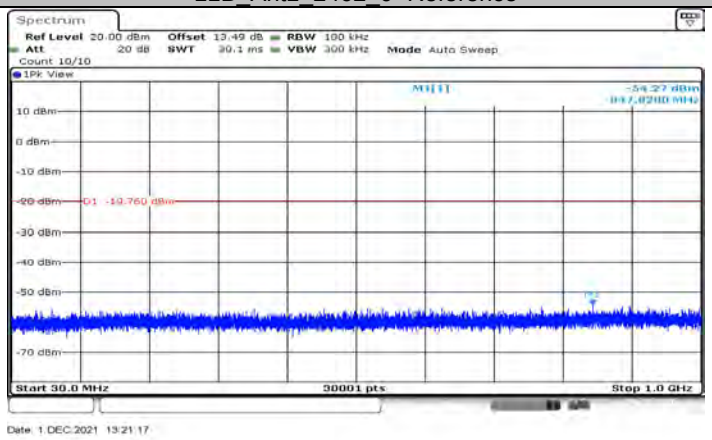


11B_Ant1_2437_30~1000

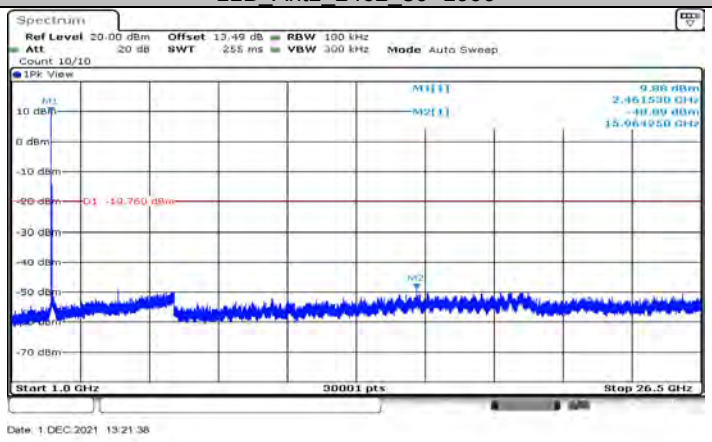


11B_Ant1_2437_1000~26500

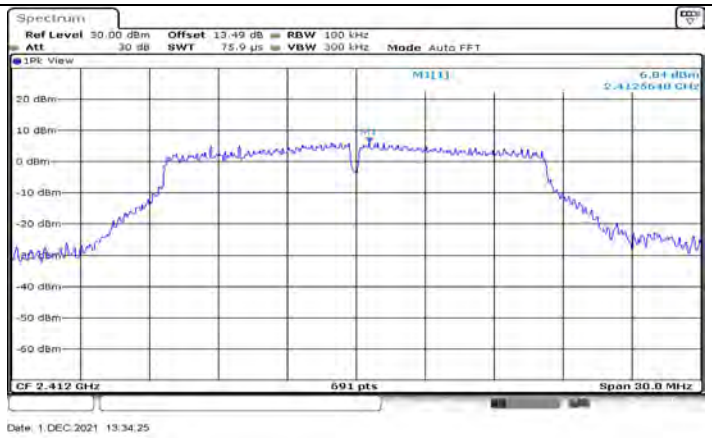
11B_Ant1_2462_0~Reference



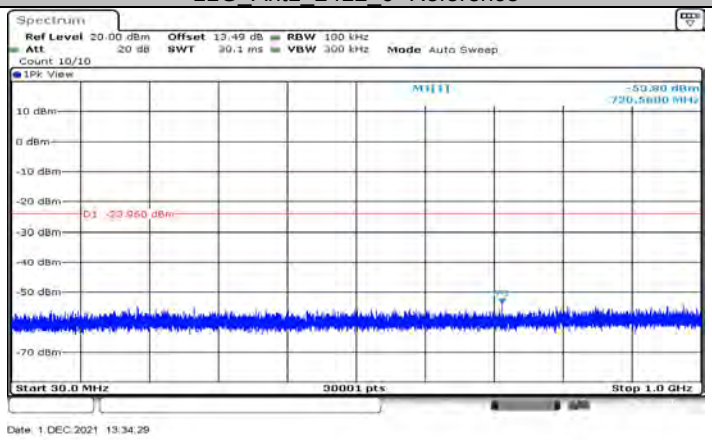
11B_Ant1_2462_30~1000



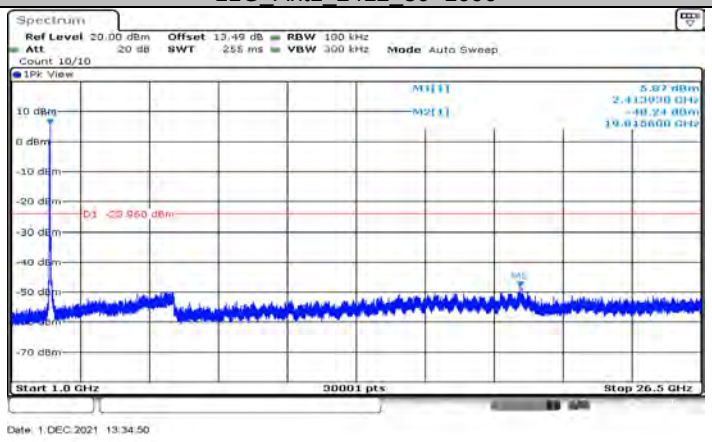
11B_Ant1_2462_1000~26500



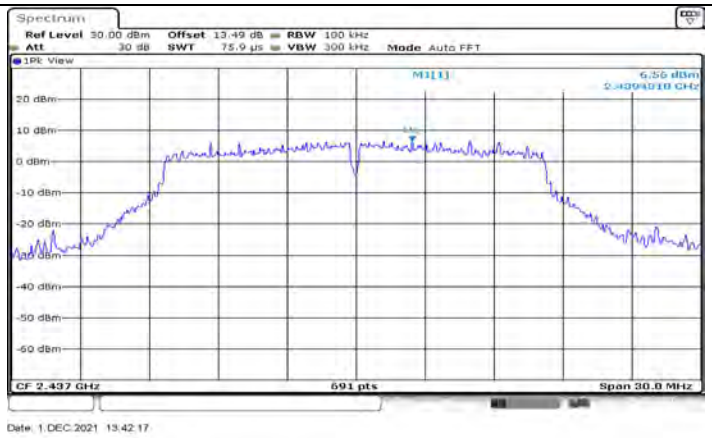
11G_Ant1_2412_0~Reference



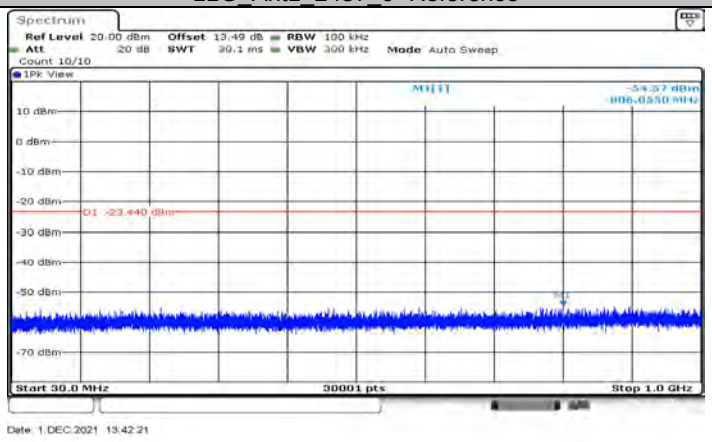
11G_Ant1_2412_30~1000



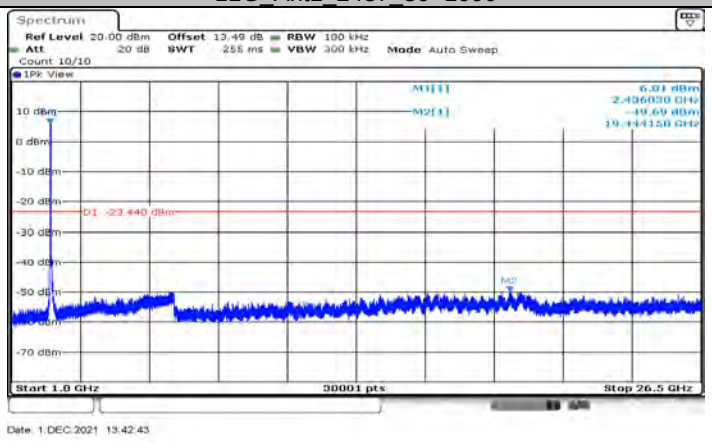
11G_Ant1_2412_1000~26500



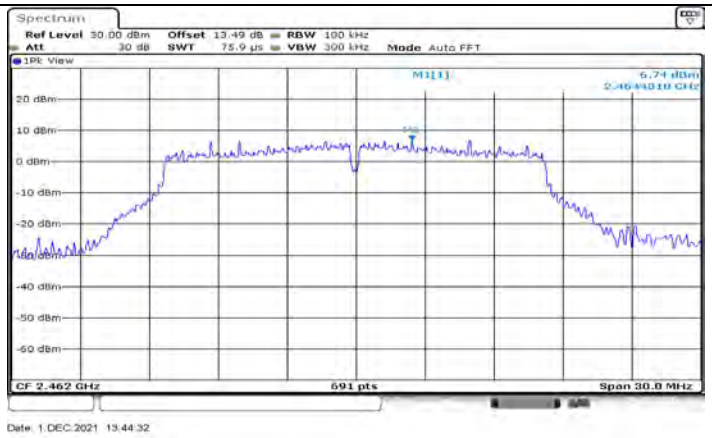
11G_Ant1_2437_0~Reference



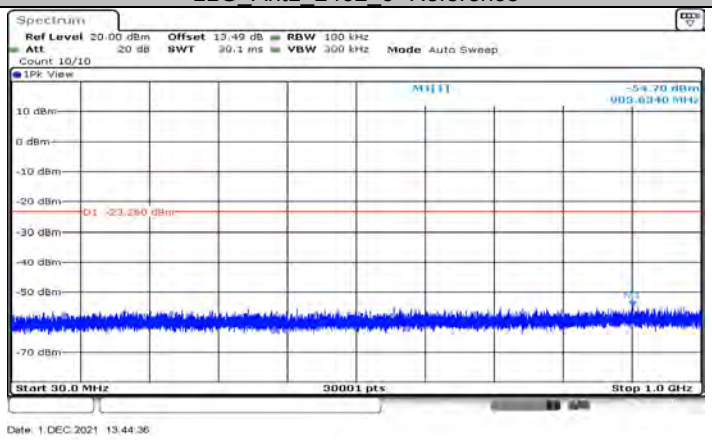
11G_Ant1_2437_30~1000



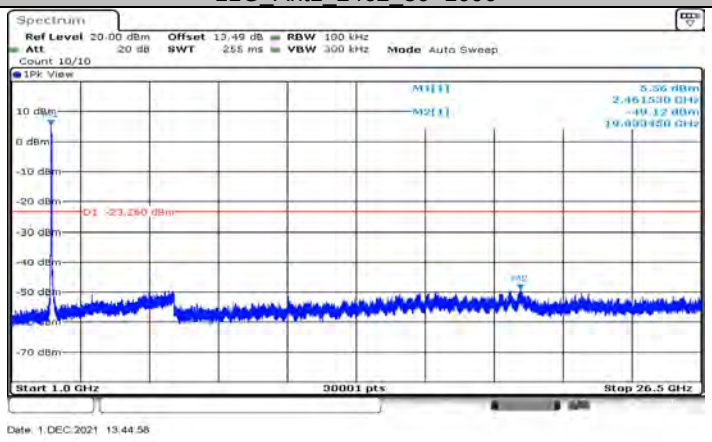
11G_Ant1_2437_1000~26500



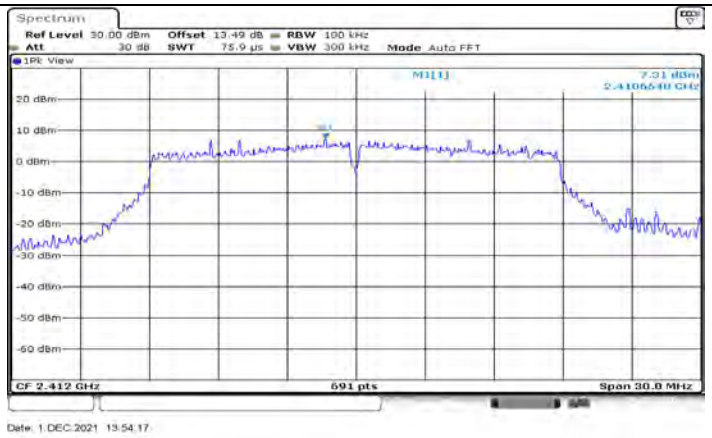
11G_Ant1_2462_0~Reference



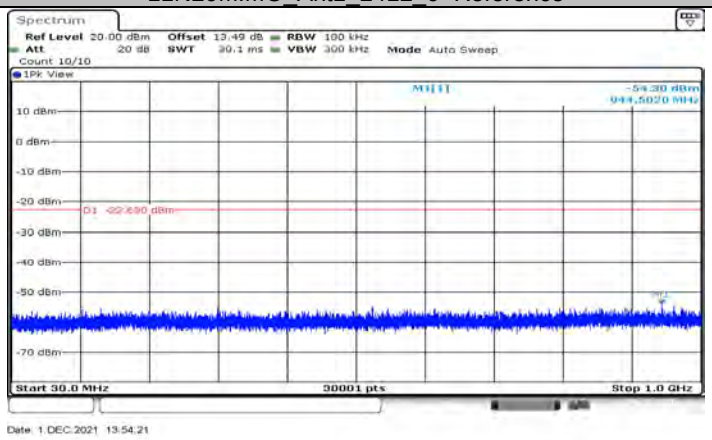
11G_Ant1_2462_30~1000



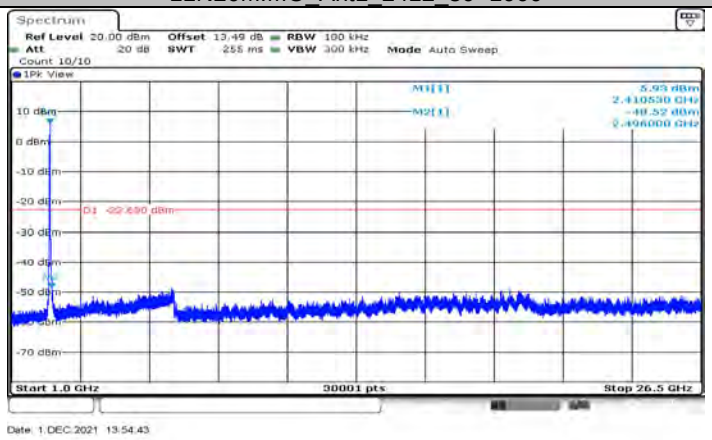
11G_Ant1_2462_1000~26500



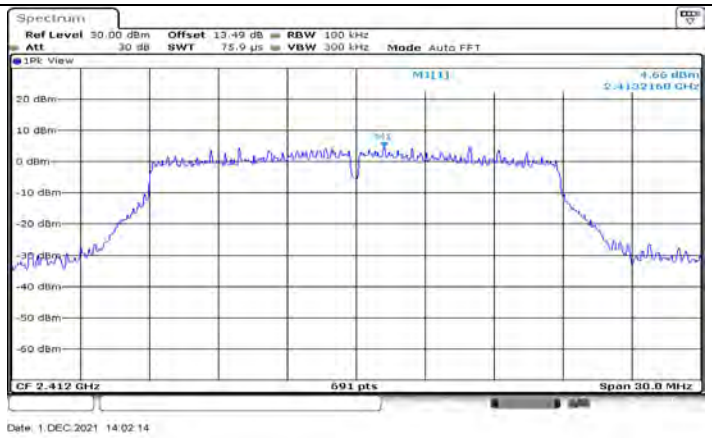
11N20MIMO_Ant1_2412_0~Reference



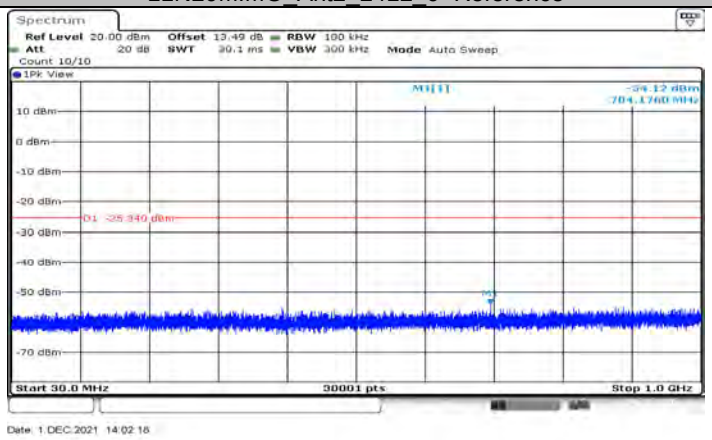
11N20MIMO_Ant1_2412_30~1000



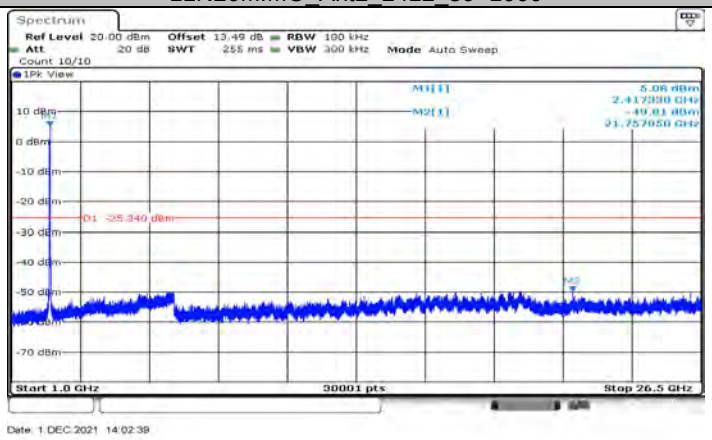
11N20MIMO_Ant1_2412_1000~26500



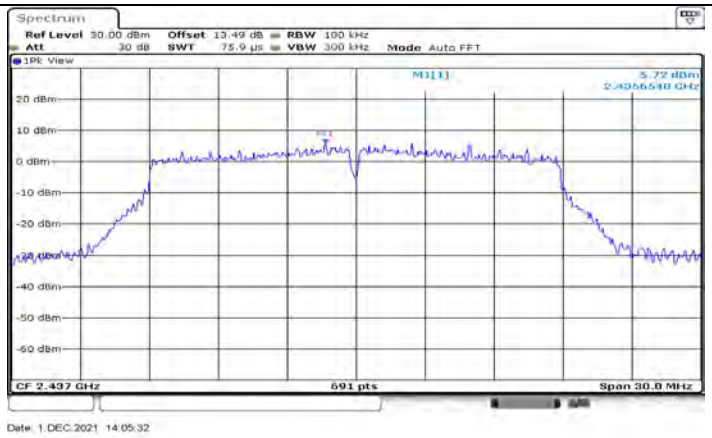
11N20MIMO_Ant2_2412_0~Reference



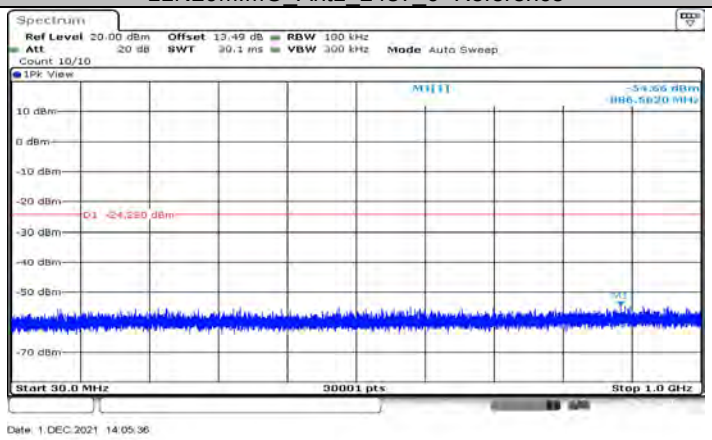
11N20MIMO_Ant2_2412_30~1000



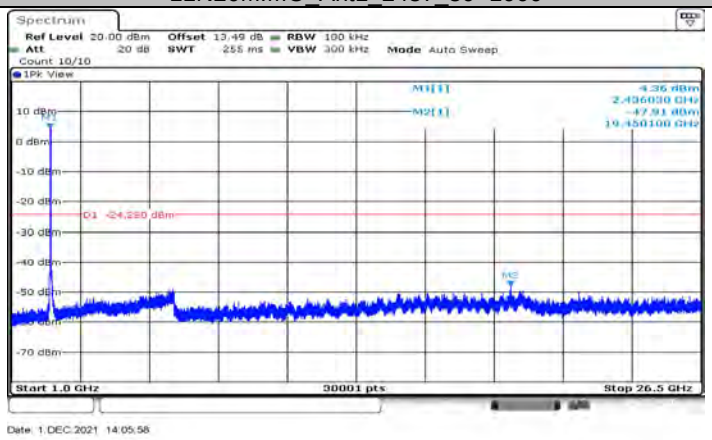
11N20MIMO_Ant2_2412_1000~26500



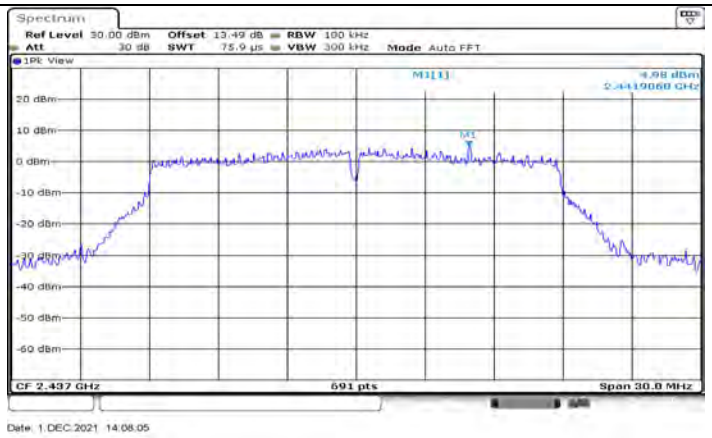
11N20MIMO_Ant1_2437_0~Reference



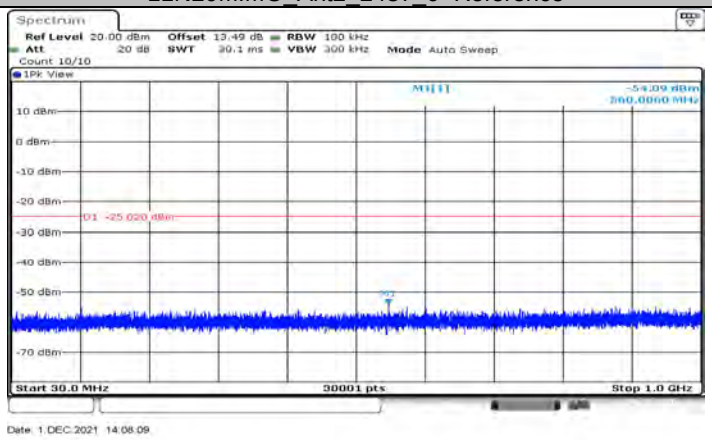
11N20MIMO_Ant1_2437_30~1000



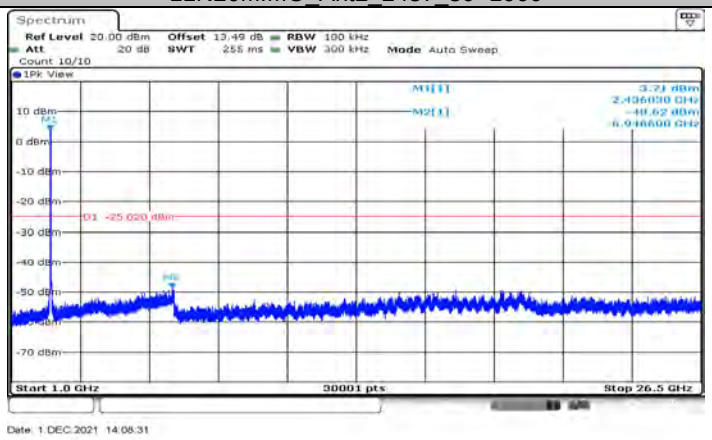
11N20MIMO_Ant1_2437_1000~26500



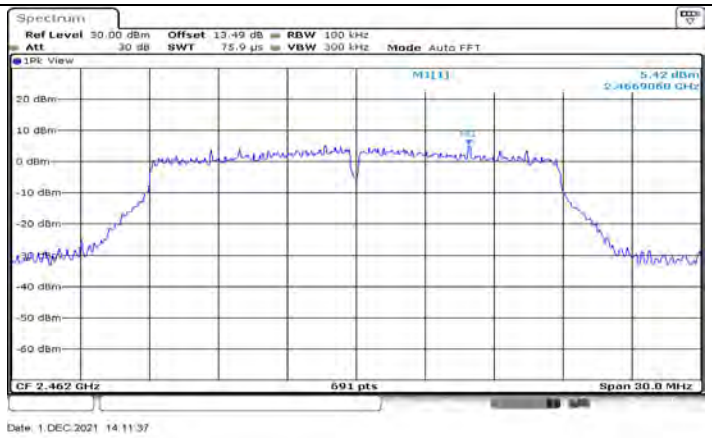
11N20MIMO_Ant2_2437_0~Reference



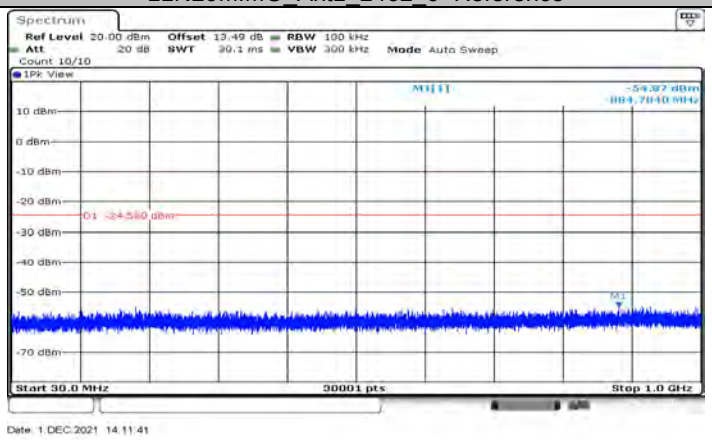
11N20MIMO_Ant2_2437_30~1000



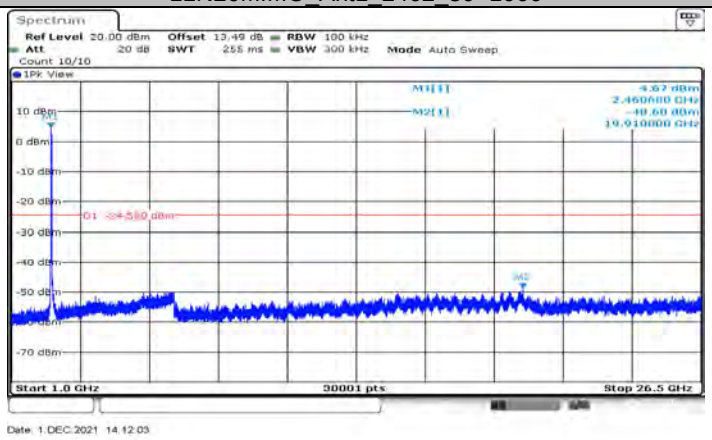
11N20MIMO_Ant2_2437_1000~26500



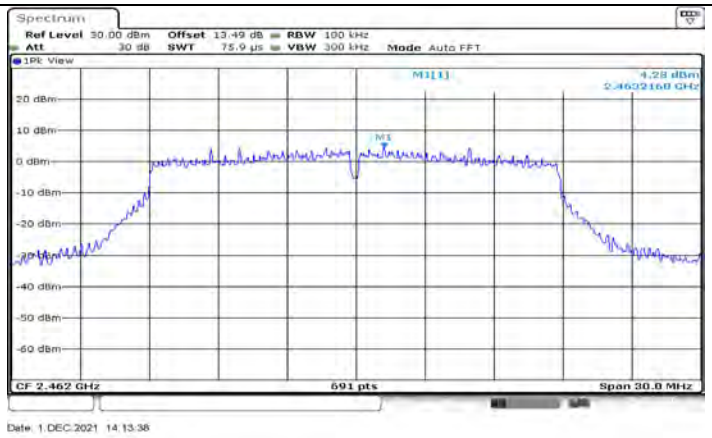
11N20MIMO_Ant1_2462_0~Reference



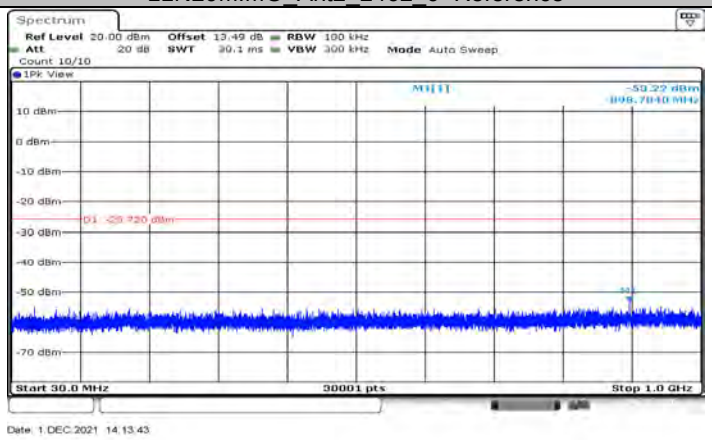
11N20MIMO_Ant1_2462_30~1000



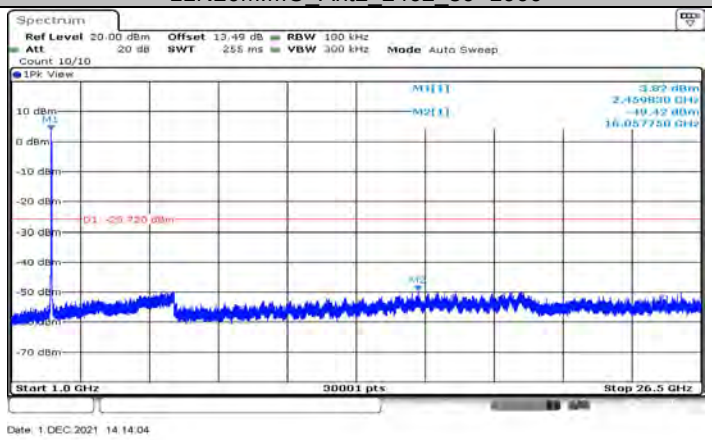
11N20MIMO_Ant1_2462_1000~26500



11N20MIMO_Ant2_2462_0~Reference



11N20MIMO_Ant2_2462_30~1000



11N20MIMO_Ant2_2462_1000~26500

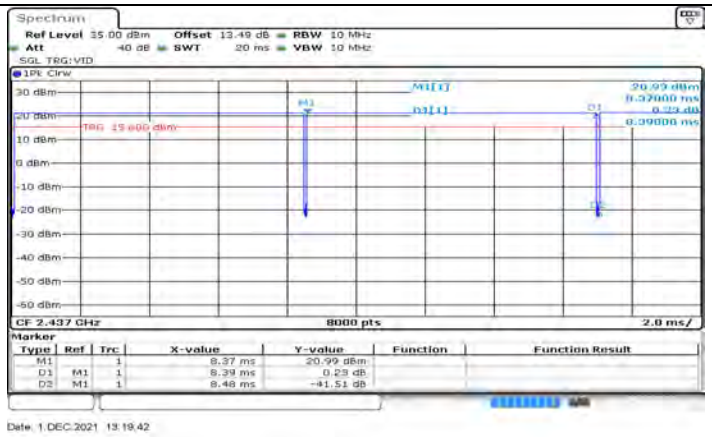
10.7. Appendix G: Duty Cycle

10.7.1. Test Result

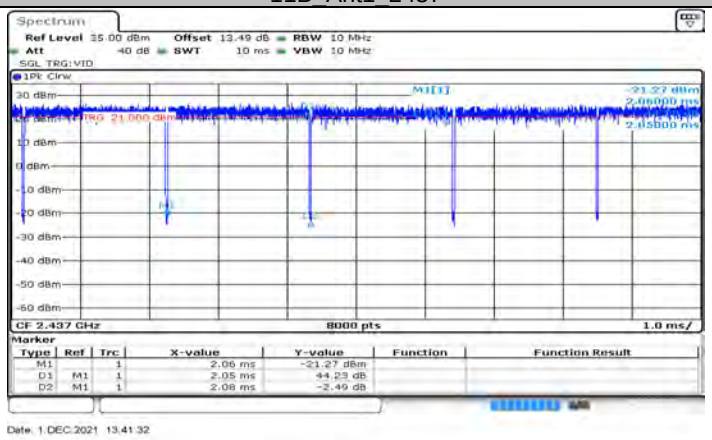
Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
11B	8.39	8.48	0.9894	98.94	0.05	0.12	0.01
11G	2.05	2.08	0.9856	98.56	0.06	0.49	0.01
11N20MIMO	1.90	1.92	0.9896	98.96	0.05	0.53	0.01

Note:
Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer then the next higher value should be used.

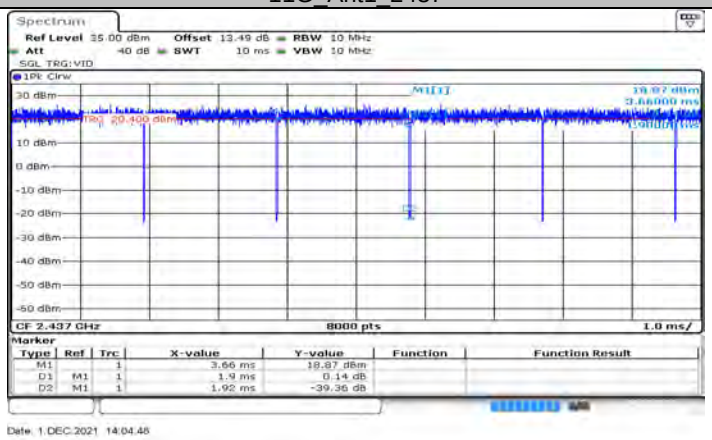
10.7.2. Test Graphs



11B_Ant1_2437



11G_Ant1_2437



11N20MIMO_Ant1_2437

END OF REPORT